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PRACTICAL REMARKS

ON THE

CAUSES, NATURE, AND TREATMENT

OF

DEFORMITIES OF THE SPINE, CHEST, AND LIMBS, MUSCULAR WEAKNESS, WEAK JOINTS, MUSCULAR CONTRACTIONS, AND STIFF JOINTS;

CONTAINING

THE RESULTS OF THE AUTHOR'S EXPERIENCE, AND SHOWING THE ADVANTAGES DERIVED FROM THE MODES OF TREATMENT WHICH HE HAS RECENTLY INTRODUCED;

WITH

ILLUSTRATIVE PLATES AND CASES.

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LATE LECTURER ON ORTHOPEDIC SURGERY, &c.

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PREFACE.

The principal part of this Volume was prepared for the press in the winter of 1838-9. The Plates were printed, and I intended to publish it in the course of the spring of 1839. Circumstances, however, have prevented its publication until now. I have added two Plates to the number before printed, and have obtained another year's experience, which has served to enlarge my views and to strengthen my conviction of the soundness and safety of the practice which I recommend.

In this Volume I have refrained from entering into the detail of the construction of, and of the several modes of managing, the mechanical contrivances which I employ; my object being, in the first instance, to communicate to my readers the results of my experience in the management of a class of cases which for the last sixteen years have occupied much of my attention. It was not, however, until about three years ago that I arrived at the knowledge of the plans of treatment, which I now practise, and which I find so eminently beneficial.

In the following pages I have shown the effects of my present treatment by Plates and Cases, to which I might have added many others; but the number I have given will suffice, I hope, to make my views clear, and the results of my practice satisfactory.

I have to express my acknowledgment of the kindness and consideration of those of my patients and their friends who have granted me the liberty to have such drawings taken of their persons as tend to illustrate the improvement which I have been enabled to effect.

The drawings were taken by Mr. Frederick Tatham, partly from casts

and partly from the body, and by him also they were afterwards placed on stone. The object has been, accurate delineation of the deformed and the improved condition, so that in many of the Plates both may be at one view presented to the eye. Those who are acquainted with Mr. Frederick Tatham's remarkable talent in the use of the pencil will be able readily to admit the fidelity shown in the Figures.

Let those who have derived relief, or may hereafter be benefited, by the means which I employ, give God thanks; and if there be any praise or any glory, let them remember to whom the same is due: not unto man, but unto God, the Author of mercy and the Giver of wisdom, and of knowledge, and of everything that is good and that is fit for man's use.

TO THE

MEMBERS OF THE MEDICAL PROFESSION.

I HAVE considered it expedient to secure to myself for a time, by Patent, the control and use of certain of my contrivances which I employ in the treatment of Deformities, Stiffness, Weakness, &c. This is so novel a mode of proceeding, in such matters, with medical men in this country, that, as it might have been expected, some of my medical brethren have, at the first view, been disposed to condemn, while others have fully approved of the course I have taken.

I have found on former occasions that my inventions have been improperly constructed, and that their utility has been greatly diminished by vain, ignorant, and unprincipled persons, who have mutilated my apparatuses, so that the principles which I have pointed out could no longer by them be carried into effect, and have introduced what they have called improvements, by which the originals, like the painter's picture, are so much hidden, that I should be ashamed to acknowledge them to be mine, though they are made to bear my name.

I sought to remedy this evil, in a measure, by opening a Factory, where medical men might have been supplied with my contrivances, for fractures and various other purposes, made agreeably to the principles which I have published, without intending to appropriate to myself any profit that might accrue from the sale. This, however, was not sufficiently supported to lead me to believe that my plan was acceptable to the Profession, and it was therefore discontinued.

For many years surgeons have rarely been furnished with my appa-

ratus made according to my principles and plans. The result of this has been much disappointment on the part of those who have honestly sought to procure for their patients those advantages which they are capable of affording. Patients have needlessly suffered much pain and confinement, and many other evils arising partly from this cause, and on other occasions from the misapplication and mismanagement of my means; and the burthen of all this has been cast upon my shoulders. Hence it appeared to me most expedient, in the introduction of apparatuses requiring much more care in manufacture, application, and management than any I had previously invented, to secure to myself the entire control of them for a time; and, independent of all other considerations, I believe that this will ultimately be found the safest and most advantageous mode of proceeding which I could have adopted for the Profession as well as for the Public.

Having taken this course, it became necessary that I should advertise, in order that the Public might not be deprived of the advantages of my plans of treatment in the relief and cure of a class of cases in which the Profession, from the frequent failures they have witnessed, are slow to admit that any benefit can be obtained. Some at the first glance have been disposed to condemn this practice as unprofessional; but I would ask, what other course could be adopted to inform persons afflicted with deformity, &c., residing in remote parts, that means have been discovered whereby they may obtain relief? I might have published a work upon the subject, but every one knows how slowly professional works become known, and that many years must have elapsed before the Public could have been really acquainted with the knowledge of the existence of my inventions; and what is the difference after all, in principle, whether I advertise the effects of my patent inventions in a work in the customary manner, or in the periodicals of the day? The object in both cases is the same—public relief and private advantage; for "the labourer is worthy of his hire."

After what I have said, I hope those who may have felt adverse to the course which I have taken will, upon further consideration, impute to philanthropic motives, at least in part, what they have hitherto been disposed to condemn, seeing that in advertising I interfere with no man's right, public, professional, or private ; and that my object is, in connexion with my own rights, to be instrumental for the benefit of all to the utmost of my power.

Burton Crescent, May, 1840.

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INTRODUCTION.

BEFORE entering upon the subject matter of this work, it might be well to give the reader a general notion of the nature of bones, ligaments, muscles, and nerves, the parts which are principally affected by the maladies of which I am about to treat.

STRUCTURE OF BONE.

Bone is composed of two substances; one of these is of an animal, and the other of an earthy nature. The tissue of the bones differs considerably in man and the lower animals. The bones are soft and flexible in young animals; and they acquire hardness and rigidity as the body attains to maturity, and become fragile in old age.

The slower the process of organization in an animal, the longer is the period of its growth and life. As the structure of the bones becomes rigid, the vital functions are carried on in them with increasing difficulty.

The degree of hardness varies in the different parts of the same bone, and is greater in some bones than in others. In those parts where there is the greatest portion of earthy matter, the bones are harder than where the earthy substance is less abundant.

Bone is a secretion from the blood. It contains in its structure blood-vessels by which it is nourished, and absorbents by which those parts that are become useless are removed. There is a continual process of change going on even in the hardest bones, certain particles being removed and others deposited in their room. The healthy condition of

the bony structure depends upon the regular deposition and absorption of the several parts, by which the bones are moulded and acquire their particular forms.

It was accidentally discovered that animals fed on the refuse of madder, employed by dyers, had their bones tinged of a deep-red colour. This discovery led to experiments, and it was found that when madder is given to animals the colouring matter of the madder appears in the bones, and when the madder is withheld for a time it is removed from them with great rapidity; proving a change in the component parts of the bony structure from absorption and deposition to a degree which is truly wonderful. All the bones are tinged in twenty-four hours; in two or three days the colour becomes very deep; and if the food be changed, in a few days the colour will be entirely removed. By the microscope it is easy to distinguish that the colour is mixed with the bony structure only, the vessels, like those of the rest of the body, having no tinge. The earthy matter which constitutes the hardness of bone is dead and inorganic. It lies in the interstices of the soft material called gelatine, which gives it consistency and strength. During all the process of ossification, both before and after the growth of the body has ceased, the absorbing and secreting vessels proportion their action to the stimulus which is applied to them; they continue to remove the bony particles as new ones are deposited by the arteries.

Bones are supplied with nerves, as well as with arteries and absorbents; they usually pass into the bone with the nutrient vessels, and yet bone is quite insensible. Soft parts have their sensibility increased by disease; this is the case also with bones, ligaments, and cartilages, which, in their healthy state, have very obscure feelings. The pain occasioned by inflammation in a bone is very distressing, and perhaps there is no pain greater than that of a wounded joint.

No essential difference exists in the organization of bones, and in

the softer parts of the body. In every bone there are arteries for the deposition, and absorbents for the removal of the earthy and gelatinous matters which constitute it; cellular substance for the connexion of its parts; and nerves to give organic sensibility, and warn the person of the existence of disease. Bony fibres are formed and renovated, undergo change and removal in the same manner and from the same causes as other parts. The extraordinary alterations of form in the bones of the cranium is a fact too well established to admit of doubt. Models have been taken of the form of the cranium, of the same individual at different ages, and the changes have been found to be very remarkable; nor is this alteration of form confined to the period of growth; for after that has long terminated, the form of the bones of the cranium will continue to change.

The bones are covered with a tough fibrous membrane, called periosteum, which adheres closely to the external surface of the bone, and communicates with it by innumerable vessels. This membrane forms a medium of attachment for the muscles which are inserted into it directly, or by the intervention of tendons.

Of Ligaments.

The bones are connected together by strong cords or membranes, called ligaments. These assist to keep the surfaces of joints in proper apposition, and restrict the motions of the bones to certain directions. The capsular ligaments, as they are called, are lined with a membrane which secretes a lubricating fluid, calculated to promote facility of motion, and to obviate friction.

There is a peculiar fibro-cartilaginous substance placed between the bodies of the vertebræ of the spine, which permits a sufficiency of motion of the several bones of the vertebral column, without weakening the support which the spine is destined to afford to the upper parts of the body in general, and to the head in particular. These fibro-carti-

lages give to the spine a high degree of elasticity, by which the ordinary concussion, to which the body is subject, is weakened or destroyed before it can be communicated to the head.

Of the Skeleton.

The bones form the frame-work of the human body, called the skeleton, which serves for the support and protection of the soft parts. The skeleton is divided into three parts—head, trunk, and extremities. The head consists of cranium and face; the trunk is divided into vertebral column, thorax, and pelvis. The vertebral column or spine is a column of bones called vertebræ, resting upon each other, and united together by fibro-cartilages, and ligaments. The spine is divided into regions, viz., neck, back, loins, sacrum, and coccyx.

The bones of the chest consist of the sternum, or breast-bone, and twenty-four ribs, twelve on each side. The sternum is a flat bone placed in front of the chest. The ribs are all articulated with the vertebræ of the back, and each of which forms part of an irregular circle, and, with the exception of two, they are all united anteriorly to the sternum by cartilages.

The pelvis is formed by the iliac, or haunch bones, the sacrum, and the coccyx, which are closely united together.

The upper extremity consists of the clavicle, which is connected to the upper part of the sternum at one end, and to the scapula, or shoulder bone at the other. The scapula is connected to the long bone of the upper arm, and this again is united to the bones of the fore-arm. At the lower end of the bones of the fore-arm are placed the bones of the wrist; next to these are the metacarpal bones, which are united at their lower ends to the phalanges, or bones of the fingers. The bones of the lower extremity consist of the thigh bone, which is united at the upper end to the pelvis, and at the lower end to the bones of the leg, called tibia and fibula. Upon the anterior part of the

lower end of the femur is placed the patella, or kneecap ; at the lower end of the bones of the leg are placed the bones of the tarsus, which are connected to the metatarsal bones, to which are joined the bones of the toes.

The bones of the skeleton are connected to one another by the bands and cords called ligaments, which, in certain parts, allow the bones to move extensively upon one another, and in others the motion is very limited. The bones of the spine are connected together, as has been said, by fibro-cartilages as well as ligaments. The spinal column is made up of twenty-four small bones, and through this column of bones, compacted together, is formed a canal in which is placed the spinal marrow, which sends off nerves as it passes along the canal, to all the lower parts of the body. The nerves pass out in pairs through holes on each side of the spinal column, each hole being formed by the junction of two vertebræ. The intervertebral substance, or fibro-cartilages, are placed between the bodies which form the anterior parts of the bones. The intervertebral substance is elastic, and readily yields to the various movements of the spinal column; the superincumbent weight causing it to assume a form suitable to the various inclinations as well as to the erect position of the spine. The breadth of the bases of the several bones, and the closeness of their junction, give the chain of bones, constituting the spinal column, its firmness and stability—the number of parts of which it is composed, and the frequency of joints, its flexibility. The flexibility varies in different parts of the column; is least in the back, where strength more than flexure was required; greater in the loins, and greatest of all in the neck, to allow the free motion of the head. In order to afford a passage for the spinal cord, each vertebra is perforated, and the perforation corresponds with others, so that when the bones are connected by their several ligaments, an entire close uninterrupted canal is formed from one end of the spine to the other. The contrivance to prevent the bones shift-

ing and breaking the line of the canal, and also to prevent gaping between them, is very admirable. The vertebræ, by means of processes and projections which allow of their being locked together, are so confined that their bases remain nearly unaltered during the various flexions and inclinations of the body. The number of vertebræ, and consequently of joints, so divides the chain that the motion of each bone is trifling, even when the back is bent to a great degree of inclination. This arrangement of the parts was very important, in order to prevent the spinal cord being injured by any of the numerous and varied movements to which the spinal column is subjected.

The general result of the admirable construction seen in the spinal column is, that not only the motions required for the ordinary purposes of life are performed with safety, but that the gesticulations of posture-masters, and the most extraordinary contortions of the body, are exhibited to the admirers of such performances without any frequent occurrence of accident.

Of the Muscles.

The muscles are the active organs by which the various movements of the bones of the skeleton are effected. The tendons are cords passing from the muscles to be fixed to the bones. The muscles derive their contractile energy from the nerves, consequently they lose their power of contraction when the nerves which supply them are divided.

The presence of arterial blood is necessary to muscular contraction. The more healthy, the more highly airified it is, the greater is the vigour of the muscles.

Each set of muscles has commonly an antagonist set, having an opposite action. This is seen in the muscles of the two sides of the trunk and in the flexors and extensors of the extremities.

Muscles have a great influence in preventing, producing, and maintaining deformities, and also in the restoration of distorted parts to

their natural relative position; hence the propriety of our taking them into consideration in the use of our remedial agents. A careful study of the actions of the various muscles will prevent the useless application of machinery in many cases, and in others, enable us to employ it with the most beneficial effects.

Of the Nerves.

The brain is the centre of connexion for all those parts of the body called nerves. The nerves are white, and have the appearance of white cords of various sizes. They proceed from, and are connected with, the brain and spinal marrow. There is a difference in the functions which the nerves perform. Some nerves are principally intended to give organic sensibility. Every part of the body is endowed with organic sensibility, which exists independent of the consciousness of the person. Under the influence of this, the stomach digests the food; the liver secretes bile; the kidneys, urine, &c. The functions of the various organs are carried on without our feeling them, and may proceed long after all consciousness has ceased. Some nerves enable us to feel the influence of external agents, and convey to the mind the feelings of pain and pleasure peculiar to animals; and others are used for the purposes of volition, and, through their agency, the muscles are moved in obedience to the will.

When the nerves of organic sensibility are injured, the functions of the particular organ or organs do not proceed naturally. If the nerves of animal sensibility be injured or weakened, or preternaturally excited, the consequences are manifested in the parts to which they are distributed. The sensations will become obtuse, weak, or unnaturally acute, according to the functional condition of these nerves. When the nerves of volition suffer from any cause, the moving powers are affected. If the functions of these nerves be vigorous and healthy, the muscles will move naturally in obedience to the will; but when

they are disordered there is convulsive or unnatural action of the muscles, which may move independent of, and in opposition to, the will. If they be weakened from any cause, the muscular energy will be proportionably weakened. If the branches distributed to one set of muscles be weakened, and those distributed to the antagonising set continue healthy and strong, there is loss of the balance of power in these muscles; and the consequence of this is deformity, which will progress more or less rapidly according to the degree of difference in the power of the antagonising muscles. The muscles, in their healthy condition, as has been said, tend to sustain the bones in their proper relations; but when the balance of power between them is lost, they are principal agents in producing distortion.

General Remarks on the Nature of Deformities, &c.

The bones are connected together by ligaments and muscles, and are retained in their proper relative bearings principally by the due performance of the functions of the muscles. The ligaments are so arranged that they permit the bones to move upon each other in every direction that the muscles are calculated to effect; and a due reciprocity of action between antagonist muscles is necessary to maintain the bones in their natural positions. When the flexors or extensors of a limb, or the principal of them, are deficient in power, the balance of power between the opposing muscles is lost, and distortion is consequently induced. The due action of muscles and their consequent vigour strengthens the ligaments, and even tends to increase the compactness and strength of the bones. In strong athletic persons the ligaments are of a greater tenacity than in persons of a lax muscular fibre.

Muscular power is very variable throughout life, and is influenced by the various changes that affect the general health of the constitution. The correctness of form and the solidity of the bones are in such

close dependence upon muscular action, that their due relations will be disturbed if the muscles are diminished in energy.

The same causes which operate in producing muscular debility extend their influence to the ligaments. The natural relative position of the bones is maintained in a great measure by the tension, contraction and elasticity of the muscular apparatus. When the healthy condition of any set of muscles is destroyed, and the integrity of the articulations is left principally to the strength of the ligaments, the superincumbent weight soon overcomes their power of resistance, and distortion of the bones is commonly, if not universally, the consequence. In cases where the ligaments have become elongated, so as to allow of deformity, it is a long time, even under the best treatment and most persevering attention, before they recover their natural length and firmness.

The contraction of cicatrixes after burns are more formidable than muscular contractions; contractions of cists, after the cure of abscesses of the lungs, are also very great, and may be sufficient to draw the vertebræ out of their proper line and to bend the ribs inwards.

Any alteration in the natural form of the skeleton will induce a change in the state of the muscles. The muscles are disposed in such a manner as to admit of a certain degree of tension; when the bones are distorted the extremities of the muscles are no longer fixed at their proper distances. If the extremities of muscles be brought nearer, or separated to a greater distance from each other than is natural to them, or if, which is the case in deformity, their power be diminished or destroyed, the consequences are the same—extenuation and degeneration, to a degree commensurate with the unfavourable mechanical circumstances under which they are placed, and the length of time which is permitted to elapse before curative means are resorted to. In certain cases of club-foot, for instance, the natural fulness of the calf of the leg is wanting; but as the deformity is lessened, and the muscles are brought into action in their natural relations, the proper enlargement

of this part becomes manifest. In bad cases of distorted spine, some of the muscles are in the same state as in the legs of persons with club-feet, small, pale or yellow, in a languid state of nourishment, and sometimes degenerated into a kind of fatty substance.

Any deviation of the spine destroys the harmony between the bones and muscles; some of the latter are elongated and some shortened; their due degree of nutrition and their power of contraction will be both deranged, whether the extremities of the muscles have undergone an unnatural degree of separation or the reverse. It follows, that if, on the one hand, partial muscular weakness lays the foundation of deformity, in consequence of certain parts of the skeleton being left to be sustained in their proper positions by the ligaments; so, on the other hand, distortions produced by other causes engender debility of muscles, by destroying the natural line and force of their contraction.

If curvature of the spine takes place in persons afflicted with general muscular debility arising from long continued disease, the convex part of the curve is placed posteriorly. If the muscles be weaker on one side then on the other lateral curvature will be induced. These evils will increase if neglected, and the curvature become permanent. Hence the propriety of having recourse to well directed exercises in the early stages of spinal curvature in order to restore the power of the muscles, and thereby to re-establish the natural direction of the bones. If the power of the muscles be not restored, the ligaments will soon become elongated from the operation of the superincumbent weight, and the bones themselves will become deformed. When these latter consequences have supervened, well directed exercises, accompanied with a generous diet, are not sufficient to restore the muscles, ligaments or bones; there must now be superadded effectual and well adjusted support, in order to sustain the bones, and direct them towards their natural relative bearings upon each other. In by far the greater number of cases of lateral curvature, the projection of the convexity of the dorsal portion is towards the right side, and consequently it fre-

quently happens that the right shoulder is more elevated than the left. If, however, the whole spine be involved in two equal curves, the height of the two shoulders continues nearly equal.

Attitude, has an influence in the production of deformity. Its effects, however, are seldom manifested except in persons of lax fibre, or in those who have a strumous taint.

Deformity may be congenital, from an inequality in the parts of the two sides of the body. The muscles, and in some instances, the bones, are less developed on one side of the body than on the other.

"There is, perhaps, no notion more pernicious than the supposition that children will outgrow deformities. That a deformity will often stop at a certain point, and as the body grows will be less apparent, is a well known fact; but the instances of a natural cure are so few, that all such hope ought to be abandoned, and proper means of cure had recourse to at as early a period as possible. Children with distorted limbs are sent from their homes to the sea, in the hope that, by increasing the vigour of their constitutions, the deformity may be removed; but disappointment too generally follows, and the malady, augmented during the time so devoted, must sooner or later be met by the only certain methods of cure — mechanical assistance and means which give tone to the faulty muscles."—Treatise on Deformities, by L. J. Beale.

There is another popular error in respect to deformities, namely, that the deforming process will stop with the period of growth: so far is this from being correct, that it frequently happens that the deforming process goes on more rapidly after the growth of the body has ceased than before, and cases of lateral curvature sometimes commence even long after the growth of the body has terminated, and proceed to a very distressing extent.

Every period of life is subject to the occurrence of deformity, partial weakness and stiffness of the limbs and trunk. Some deformities are congenital, as club-foot, malformation of the hip-joints, and in-

equality of length of the legs. Others occur very early in life, in consequence of scrofula or rickets; spinal curvature generally commences between the ages of eight and eighteen; this is especially the case with those which result from muscular debility, while those consequent upon disease of the ligaments, cartilages, bones, and rheumatic complaints, affect persons at all ages. With regard to the period of life to which the possibility of curing deformity extends, it is to be observed, that the cure does not so much depend upon the age as it does upon the cause and the nature of the deformity, and the condition of the affected parts. The earlier the stage in which curative means are had recourse to, the better; but it may be considered as a general rule, that, during the period of growth, most distortions that are at all curable may be entirely removed. So long is it before any marked effect is produced upon the bones in some varieties of club-feet, that many of these distortions may be entirely effaced at almost any period before growth ceases. Even after the period of youth, they may be much benefitted, and sometimes altogether removed. These remarks apply also to many varieties of curvature of the spine and deformity of the chest. It is not every case that can be cured, but there are very few cases that do not admit of being considerably alleviated.

General Remarks on the usual Modes of Treatment.

The treatment which has been adopted for the purpose of remedying the deviations of the spine and chest and other deformities, has varied greatly in the hands of different persons. Surgeons, and others, have been very much influenced in adopting particular modes of treatment, by the different views which they have had of the causes and nature of these cases.

Surgeons have been much accustomed to leave the treatment of deformities, and other complaints which require mechanical assistance for the restoration of the affected parts, to the care and management of mechanists, who, for want of adequate knowledge of

the structure and functions of the human body, have attempted to produce relief under great disadvantages; and though, under these disadvantages, some good has been effected, yet, as might have been expected, much evil has ensued.

Mechanists may do too much or too little; but even if they employ only such apparatus as may be needful, it is proper that this be used with reference to the structure and functions of the body, and also with reference to the particular restorative power of each individual, as well as other special circumstances that may attend each case; with which, however, a mechanist is not supposed to be acquainted.

Some time ago a young lady was brought to me with inversion of the ankle bones, commonly called in-ankle, with some yielding of the arches of the feet, so that the child walked with great difficulty. Her father had taken her to one of the most experienced mechanists in London, and he had applied much more apparatus than the case required, and in a manner calculated to be but of little use. The child was greatly encumbered, and was unable to walk in the apparatus; but, in order to obtain relief from her malady, she was required to stand in them for a certain time daily. The father placed his daughter under my care, and I applied some little contrivances which I am accustomed to use in such cases, and which were not probably a tenth part of the weight of those previously employed, and now she is able to walk with freedom and ease,—not only without any feeling of encumbrance, but with the comfort and boldness which the sense of support and safety, arising from the apparatus, afforded. Case.

A young lady was placed under my care with a lateral curvature of the spine, who was every now and then affected with a short cough, to which she had long been subject. This case required occasional medical treatment, and more or less suspension, for the time, of those special measures which were adopted for the relief of the curvature of the spine. Case

A young gentleman was brought to me with a stiff knee-joint and Case.

contraction of the muscles, so as to keep the leg bent upon the thigh. This condition of the limb arose from severe and long-continued disease in the knee-joint. This case required great circumspection in the management, and occasionally local applications, to subdue the tendency to disease in the joint.

These cases will be sufficient to show, that those persons who undertake the treatment of deformity, contractions, stiffness, or weakness, occurring in various parts of the limbs and trunk, should previously acquaint themselves with the nature and treatment of disease, as well as with the structure and functions of the body. If a person be not acquainted with these subjects, he goes to work at a venture, and in this way may occasionally do good, but is always in danger of doing much mischief.

Principles of Treatment.

There are three principles of chief importance to be borne in mind, in the management of all curvatures of the spine, which have *not resulted* from the destruction of part of the spinal bones, or of the substances which lie between them; viz. first, To bring the bones into their natural position; second, To sustain them in their natural position, by the help of adequate support, as long as may be necessary; and, third, To increase the tone and restore and maintain the balance of power in the muscles, especially those connected with the bones of the spine, so that when the natural figure of the bones is restored, the spine may be maintained in its proper direction, by the action of the muscles, without artificial aid.

Common modes of Treatment.

Some seek to restore the bones to their proper position by confining their patients on the back, and by the use of weights and windlasses.

Confinement on the back.

This plan, in connexion with the use of crutches, has been long followed on the Continent, and on a more limited scale in this country. It embraces, however, little more than the first of the principles I have mentioned. A late author, when treating of the plans which he had witnessed in France, says, "I have given to spinal distortion considerable attention. I visited all the establishments in Paris where

spinal deviations were treated by the ablest men in the profession; I had frequent relations with them, and took every opportunity to gain information and knowledge. I saw the children in the gymnasia, in bed, shielded with irons of all sorts. I did not confine myself to interested plans, I studied each method, each system at M. M. Maisonnabes, Pravaz, Bouvier, Lafond, Mellet, Tavernier, Amoros." Further on, he speaks very strongly in condemnation of the Parisian modes of treatment:—he says, "Some orthopedists are so devoted to their machinery, that no punishment inflicted in a prison, can be compared to that inflicted by this machinery on innocent children; and they are unwilling to listen to any method that may relieve children from the trammels imposed on them;—the slave-trade alone can furnish examples of similar cruelty, in ships where wretched victims of cupidity are bound down, or fastened by a chain six feet long. Every one pities prisoners, but in mechanical beds the movements are more limited, the chest is deprived of motion, it is a species of anticipated *death*."

The bones may be much influenced, and even reduced to their proper relative places, by such mechanical forces rightly employed, but there is no sufficient aid to sustain them in their places, neither are any of the means resorted to, under this plan of treatment, sufficient to restore the natural powers and functions of the muscles. One principle in this method is to extend the spine, by drawing the two ends in opposite directions. Now, to say nothing of removing the natural curves as well as the unnatural, under extension as it is sometimes employed, it might be noticed that this plan is calculated to stretch and elongate the ligaments by which the several bones of the spine are connected, so that the spine is in danger of becoming much weakened, in consequence of the elongation of those parts by which the bones are naturally bound together. This might greatly retard the recovery of the patient. Persons are confined for years in the inclined or horizontal position, and subjected to all the usual routine

of management, connected with this practice, not only with little ultimate benefit, but sometimes with positive mischief, constitutional and local. This is a practice to which I am much opposed; and, with the additional aid which I now possess, I might say that I am not acquainted with any case of curvature, unattended with disease, in which this practice would be justifiable.

Objections. I object to this plan of treatment, because it does not answer the indications which should be carefully attended to, in the management of these cases. It is not to be depended upon as a mode of restoration, and it is calculated to be injurious, by weakening the patient, and laying the foundation of disease.

Modification of the above Treatment. By some the above treatment is recommended, with the addition of such exercises as may be taken without permitting the patient to bear upon his feet.

Objections. This modification does not make up the deficiency of the former plan, neither does it remove the evil likely to be produced by the elongation of the connecting ligaments; and upon these considerations I think it ought not now to be advised.

Usual Supports. Another plan is to afford support to the spine, by the application of apparatus. Now this would answer one indication, provided the apparatus employed was calculated to afford adequate support; but this is not the case with any of those contrivances which had fallen under my observation. It is intended to support the spine, by raising the shoulders, by the aid of various apparatus, having crutches and resting upon the hips. Such apparatus are fallacious and deceptive. The shoulders may be raised without affecting the curvatures in the spine in the smallest manner, as any one may prove by raising his own shoulders by mere muscular effort. When these apparatuses are employed, so that the arms, when permitted to hang freely by the side, bear heavily upon them, there is often more or less uneasiness produced by the pressure, from which the patient may immediately relieve himself, by raising the arm by the action of the muscles. Thus it is evident, that

the superincumbent weight of the arms, which it is proposed by this plan to take off from the spine, is in fact not removed, at least only in an inconsiderable and uncertain degree. From these considerations it will be seen, why these apparatuses are found to be of so little use to the patients. I do not say that there are no cases of curvature, which would not admit of some relief by these contrivances; but they ought not to be employed in any variety of lateral curvature with which I am acquainted.

Objections.

I object to the common apparatuses for curvature of the spine, because they greatly retard the movement of the trunk, and weaken the muscles of the back; and because there is no indication in the management of these cases which these contrivances sufficiently answer.

Air and exercise.

Some surgeons trust for the most part to the influence of country air and exercise, for the restoration of persons afflicted with spinal curvature, without regard to the position of the body. This practice no doubt has risen up and become rather prevalent, in consequence of the little benefit which persons are observed to derive from either of the former plans which I have mentioned. Country air and exercise tend much to restore the health and strengthen the body; and in the very beginning of lateral curvature may be profitable in this way. It is a plan, however, which cannot be had recourse to with any confidence, inasmuch as it is often found fallacious. It is to be observed, that though the progress of these cases may be somewhat retarded by free exercise in the country, yet, it frequently happens that the deforming process is not even stopped; on the contrary, an incipient curvature may go on to the condition of a curvature in the second stage, and consequently require much more time and labour for its removal.

Examples.

A young gentleman was brought to me from the country, with lateral curvature in the second stage, and submitted to my care. He continued near me for several months, and during that time improved

considerably. While he was under treatment, his sister's back was shown to me, as a curvature of the spine had also commenced in her. She, however, was not placed under my management. In the course of a little time, through the influence of the medical friends of the family, the son was removed from me into the country. At the expiration of about five years, the father wrote to me, stating that he wished to place his son under me again ; and he desired that I would also do what I could for his daughter, as they were not improving. They were brought to me; and on examining the young lady's back, I found the incipient curvature had gone on to the second stage, and was now firm and large; and I could not say, from my remembrance of her brother's condition when he left me, that he had in any way profited during his absence.

Inference. By these examples we may learn, that though country air and exercise are profitable to the health of persons in general, yet the progress of the deforming process is not always thereby stopped; neither do I find that the absolute strength of persons with curvature is in any way increased. This may be accounted for upon the consideration, that the state of the health is very much influenced by the state of the curvature. As the curvature is removed the health increases, and as the curvature increases the health and strength diminish.

Objections. I object to the practice of leaving persons afflicted with curvature to the simple influence of country air and exercise; also to their being allowed to receive only the advantages which might be derived from the practice of gymnastic and callisthenic exercises. The first is leaving them to the powers of the constitution, placed under the favourable circumstances of a change of air—a practice which is found to be very ineffectual; and the second is, with a few exceptions, wholly inadequate to bring about those results which we desire to produce. Neither of these plans answer the indications which I have pointed out.

Should lateral curvature be permitted to take place during the progress of disease, either through ignorance, neglect, or insurmountable circumstances, it is to be borne in mind, and to be insisted upon, that it is not necessary to confine the patient wholly to the horizontal position, after the diseased action has subsided. It might be broadly stated that confinement upon the back, or in the prone position, with the simple view of removing lateral curvature, even when consequent upon disease in the spine, is a mode of treatment which is irksome, unnecessary, and calculated to be injurious, and therefore ought not to be advised. A course of proceeding, however, will now be required for the purpose of restoring the bones to their proper position, and of bringing about the natural strength and condition of the muscles, especially of those muscles which operate upon the spinal column, of which I shall speak hereafter.

Treatment after diseased action has subsided.

The treatment of deformities, partial muscular weakness, stiffness of the joints, and weakness of the joints, should be conducted upon anatomical, physiological, medical, surgical and mechanical principles; and a main reason why success has so little attended the efforts of persons engaged in orthopedic surgery is, not so much on account of the untoward nature of the cases which come under our observation, as it is because these various forms of knowledge have been so little combined and judiciously acted upon in practice. Men, eminent for their knowledge of anatomy, physiology and surgery, but having little knowledge of mechanics, have attempted to combat with these cases, and have failed of that degree of success which they desired. Surgeons, finding that they could not manage these cases for want of mechanical knowledge, have admitted the great importance of this knowledge, and their own ignorance, by putting these complaints into the hands of mechanics, or suffering them to fall into the hands of quacks; who, on the other hand, being ignorant of anatomy, physiology, medicine and surgery, go to work upon the human frame with the most daring boldness, much as

Common cause of unsuccessful treatment.

they would upon a piece of iron, wood or stone; and being also generally ignorant of mechanics in their application to the living body, often load the persons who are placed under their management with machines of a complicated nature, having little proper mechanical action upon the affected parts; and which, consequently, instead of being beneficial, often, as has been said, increase the mischief, or otherwise injure those whom they are intended to relieve.

Importance of mechanical aid.

It is, however, to be understood, and might be safely asserted, that in most cases of distortion, weakness or stiffness, the judicious use of mechanical aid is the most efficient part of the treatment. In order to conduct such cases in the most favourable manner, it is necessary to add to a competent knowledge of anatomy, medicine and surgery, a knowledge of mechanics, in their operation upon the human body. A man must be armed with all these powers, in order to combat successfully with the varieties of these maladies that come under our observation.

Usual modes unsuccessful.

Daily experience clearly proves, that none of the usual modes of treatment, in cases of deformity, &c., can be depended upon for the restoration of the body to its natural form and functions. I know the tendency which exists in the minds of the profession and the public, to abstain from all active curative measures, from the belief that the plans of treatment hitherto adopted are commonly fallacious. I am aware, that many persons, who might be easily restored, are, from the prevalence of this feeling, left without hope of relief in this life. It is evident, therefore, that there was great room for improvement in this department of surgery. I have been enabled in a measure to supply the deficiency; and the results of my inquiries into the nature and treatment of deformities, weakness and stiffness of the several parts of the limbs and trunk, I shall now proceed to lay before the public. It will be seen by the cases herein reported, that there are plans of treatment safe and certain in their operation, the results of which are calculated

to revive the hopes even of many of those who have been given up to labour for the remainder of their days under the bodily sufferings and mental distress which these maladies occasion; and which are often, to an extent of which none can form an idea but the afflicted themselves, and those who are confidentially conversant with them.

General Remarks on the Means employed by the Author.

At an early part of my professional career I was induced to consider the causes of the insufficiency of the various apparatus used in the treatment of fractures. My attention was for a time especially directed to the investigation of the nature and treatment of these cases, with a view to render this department of surgery more practically safe and useful. My inquiries led to the invention of my contrivances for fractures of the trunk and extremities.* The results of my treatment of fractures, in hospitals and in private, by the aid of these contrivances, is now before the public.† By these results it will be seen that I am enabled to save my patients from much unnecessary confinement and suffering; and at the same time to preserve them from the deformity and consequent claudication which so frequently occur under the usual modes of management.

After I had established my principles of treatment in fractures by the favourable issue of a large number of cases, my attention was more especially directed to the treatment of deformities, contractions, and muscular weaknesses, which, in this country, have been, for the most part, left to the management of persons ignorant of the anatomy and functions of the human body. Some of the apparatus used by persons of this description show much ingenuity in contrivance; but in consequence of their not being adapted to the structure, and managed with a

* For the first of these contrivances the author was rewarded by the Society of Arts, who presented to him their gold medal by the hand of their president, His Royal Highness the Duke of Sussex.

† See the Author's "Practical Remarks on the Nature and Treatment of Fractures of the Trunk and Extremities," 2 vols. 8vo.

knowledge of the functions, of the human body, they are considered to be more frequently injurious than beneficial.

Prejudice against the use of apparatus.

From the little benefit derived from the use of mechanical contrivances in the hands of persons unacquainted with the principles upon which they should be constructed and managed, and with the causes and nature of the various deviations to which the human frame is subject from weakness and disease, much prejudice now exists in the minds of medical men, and also in the public mind, against the use of mechanism in the treatment of deformities, either in the spine, chest, or limbs. This prejudice has arisen, let it be remembered, not from the consequences resulting from rightly constructed and rightly managed apparatus, but from those produced by the bad construction and improper employment of the various supports hitherto in use; and which are, for the most part, ill adapted to answer the purposes which should be ever borne in mind.

Other means may be successful.

We are not, however, to conclude, from the results of cases managed with the means and in the manner above alluded to, that no better results can be obtained by different contrivances and different management. To do so would be to put an effectual barrier against all improvements. It is allowed that mechanical contrivances, in the hands of non-professional persons, have been very unsuccessful; but can professional persons say more for the plans of treatment which they at present recommend? Do we find that curvatures of the spine, deformities of the chest or limbs, are removed by country air and sea bathing, either with or without strengthening and other medicines? Tendencies to deformity, arising from constitutional weakness, may often be corrected by these means; but if the deforming process has made any considerable progress, this plan also is unavailing. The superincumbent weight of the body, in such cases, falls upon the deformed parts in such a way as is calculated to increase the deformity; and the restoration of the natural tone and strength of the constitution

is rarely sufficient even to prevent the deformity increasing, and therefore, much less than is necessary to remove the deformity which has already taken place.

In cases of Spinal Curvature.

My treatment of spinal curvature unaccompanied with disease, consists, principally, in the careful use of my "Patent Exercising Plane," and "Patent Spine Support," with manipulations of the affected parts, calculated to direct the bones into their natural relative positions.

The Author's Patent Exercising Plane.

In reviewing the beneficial effects which I have observed to arise from the employment of my Patent Exercising Plane, I am enabled to state, that I find its utility very great as a means for strengthening the body generally, and especially the muscles of the back and chest. The exercises, also, greatly assist in the reduction of curvatures; and from these circumstances, I regard it not only as a valuable aid in preventing lateral and other curvatures of the spine, but likewise as a powerful, and at the same time, safe assistant in the cure of these complaints. This plane is so contrived, as to admit of being adapted to suit the varying strength of those who use it. The patient obtains, from its employment, all the advantages that can be derived from gymnastic exercises, without any of their attendant evils. Its use in improving the health and favouring the development of the natural figure, it will be seen, far surpasses any thing hitherto introduced, while at the same time the exercises are to many rather a source of amusement than otherwise. I regard the Exercising Plane to be of so much importance in the treatment of lateral curvature, as well as excurvation not arising from disease, that it ought not to be dispensed with; and, as a means of preventing lateral curvature by strengthening the system and increasing the general tone, power and development of the body, it cannot be too extensively employed.

Used with

Though the Patent Exercising Plane is a valuable contrivance for preventing distortions of the spine, and a great assistance in the treatment of these maladies, and though when its use is judiciously directed,

it is of itself the principal means in removing incipient deviations of the spinal column, it is to be understood, that when the deforming process has made any considerable progress, other means, calculated to give support, must at the same time be had recourse to, in order to bring these cases to a favourable termination.

the Author's Patent Spine Support.

I employ, with my Patent Exercising Plane, my Patent Spine Support; one of the peculiar operations of which is, that by its use, every unnatural projection of the bones of the spine and hips is made to assist in removing all other unnatural projections of these parts. This support is not used alone to remove curvatures of the spine; it produces, however, a favourable influence upon the deformed parts, even when employed without the Exercising Plane. It sustains the spine at all points, especially when it projects laterally; and in proportion as the distorted bones are reduced by the surgeon, towards their proper bearings upon each other, in that same proportion are they sustained and prevented by it, from returning to their former positions: so that whatever degree of reduction can be effected by the combined operation of the means employed, the same is kept by the sustaining and upholding power of this contrivance, the different parts of which, act upon the unnatural projections, like props against a bulging wall, continuing their influence, under proper regulations, at all times and in all positions of the body.

By the judicious employment of the Author's "Patent Exercising Plane," and his "Patent Body Supports," * the formation of lateral

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* The Author has recently obtained Patents for his "Body Support," which is made in several varieties to suit the age and condition of the wearer. The intention of the Author in introducing these Supports is to supply the public with articles less objectionable than the ordinary stays. They are calculated to assist greatly in preserving the natural shape of the body; and in this respect the Author regards them as preventive of many of the evils which, for want of adequate support, are now frequently observed. In cases where some of the complaints alluded to have taken place, they produce a curative influence which is found to be very beneficial. See the Author's pamphlet on his "Patent Body Support," which may be procured at No. 8, Berners-street, Oxford-street.

curvature may, with very few exceptions, be wholly avoided ; and by the combined operation of his Patent Exercising Plane, and his Patent Spine Support, those curvatures of this description, now in existence, may, with little further aid beyond manual dexterity, be either entirely removed or greatly alleviated.

In Stiff Joints.

Stiff joints, arising from preternatural contraction of some of the muscles, or from some disease in the joints, are frequently met with in practice; mechanical appliances are the most efficient means for removing these complaints. It will be seen that cases of this description yield readily to my patent contrivances, which could not be got over by any of the plans of treatment previously employed.

In Weak Joints.

Weak joints are commonly the results of muscular weakness, but now and then the ligaments appear to be principally affected, and sometimes they occur as the consequence of disease. It will be found that mechanical aid is the most important part of the treatment in these cases. Many of these maladies are readily removed under the operation of my inventions judiciously employed without any other assistance. The means, however, must be varied as the condition of the parts may require.

Stiff joints, weak joints, partial muscular contractions and muscular weakness, as they occur in the limbs and trunk, with or without deformity of the bones, are found to exist in different degrees of severity ; they are frequently more or less complicated with one another, and, consequently, it is necessary to modify the treatment in a measure suited to the circumstances of every case. I have found that mechanical assistance is a chief part of the treatment in all these cases, but if the various means be inadequate or improperly used, they will be productive of little benefit, and often deceptive, and positively injurious. The time which is required in removing these maladies depends upon the condition of the parts and other circumstances. The period of youth is the most favourable; but after the growth of the body has ceased, great benefit

may be effected, and, in many cases, even at an advanced period of life, the body may be restored to its natural form and functions. The earlier the treatment is commenced, after the malady has become manifest, the more speedily will relief be obtained or restoration accomplished. It is gratifying to observe, that these advantages are brought about without distress and without injury to the patients; and it will be seen that in almost every instance where the health had become disturbed by the existence of deformity in the spine, the use of the various means employed by the Author for the improvement or restoration of the figure, has been attended with a marked improvement in the health, and in the general tone and strength of the constitution.

CHAPTER I.

Curvatures of the Spine.

Curvatures of the Spine may be divided into those curvatures which take place independent of manifest disease in the affected parts; and those which are occasioned by disease of the bones of the Spine or of the parts which connect them together.

SECTION I.

Of Lateral Curvature.

Of the Causes and Nature of Curvature, without Disease in the affected Parts.

The causes of the deviation of the spine from its natural line, when unaccompanied by disease in the affected parts, are various; but it appears to me, that by far the most frequent cause is the loss of the balance of power in the muscles of the trunk. Curvatures arising from this cause are commonly lateral, as is seen in Plate II, and hence the term "Lateral Curvature." Sometimes the convexity of the curve is posterior only, as in Plate XXV.; occasionally, the curvature is partly posterior, partly lateral, as in Plate XXI, XXIII, XXIV.

Causes.

From partial muscular weakness.

The loss of the balance of power in the muscles, may arise from injury or functional derangement of the nerves which supply them with motive energy; and in consequence of this derangement, the nervous influence is less in some one or more of the muscles, than it is in the muscles by which their antagonization is effected. In such cases, functional derangement of some branch or branches of the nervous system is a primary cause of weakness in some one or more of the muscles, and

From diminished nervous energy.

SECTION I.

the consequence of this weaknesses, the deformity which supervenes. This defect in the nervous and muscular system is commonly less manifest in the complicated muscular apparatus of the trunk than in the extremities of the body, where it is of such frequent occurrence as to come almost daily under our observation.

Causes of functional derangement in the nerves.

The causes of the derangement in some branches of the nerves, which render them defective conductors of the motive influence, are often very difficult to trace. It arises occasionally from some disease affecting the whole body, as fever, small-pox, measles, &c.; sometimes from the influence of lead, used for medicinal purposes, or as it is employed in the useful arts.

Case.

Some time ago, I was consulted respecting a young lady who had lost the power of nearly all the muscles of one of the lower extremities. This condition of the limb was attributed to the injudicious use of litharge-water, applied to the foot when she was a child.

House-painters frequently suffer from this cause in the upper extremities, especially in the hands, and also in other parts of the body.

Muscles equally affected.

If the antagonizing muscles are equally affected, there is no manifest deformity. The weakness of the muscles is sometimes such, that the limb, left to itself, obeys the influence of gravity, falling into various positions according to the circumstances in which it happens to be placed.

Difference in the muscles sometimes slight.

Sometimes the difference in the power of the muscles is but slight. In such cases the balance of power might be easily restored. In other instances the difference is very great, in some cases even to the loss of all power of action; and the defect observed in the development of one or more of the muscles is also very remarkable. When the parts become so extensively affected, they do not admit of restoration by any natural means with which I am acquainted. The difference in the development of certain muscles is especially manifest in Plate XVII, Figure 37, and in Plate XIX, Figure 41.

Great, with deficiency in size.

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Unequal length of the lower limbs.

When the balance of power in the two sides of the trunk is not equal, any defect in the lower limbs, or any awkward habit in standing or walking, greatly assists the progress of deformity in the spine. It is to be observed, however, that where the balance of power in the muscles of the trunk continues equal, a defect in one of the lower limbs is rarely sufficient to produce confirmed deviation of the spinal column. It has repeatedly happened, that persons have been brought to me with their lower limbs of different lengths, in whom the spinal column maintained its natural line.

Pads.

Pads, which many have recourse to, in order to conceal the deformity in the body, powerfully aid its further development. The injurious influence of pads, used for the purpose of concealment, is sometimes very great. See Plates XIX and XX.

In the delicate and robust.

It is often supposed, that spinal deviations, unaccompanied with disease, arise from general muscular weakness, but according to my experience, this is rarely the case. Lateral and other curvatures do take place in persons in whom the muscular system is constitutionally delicate, but they are by no means confined to persons so constituted. I frequently meet with cases of lateral curvature in persons who are constitutionally the most robust, and in persons who, in other respects, are beautifully formed.

In all classes especially in the higher and middle classes.

Every class of society is subject to spinal deviations; but curvature, as it occurs without disease, I have most commonly met with in the higher and middle ranks of life, and much more frequently in the female than in the male.

Causes.

The greater frequency of this complaint in the female than in the male, might be partly attributed to the greater delicacy of the female constitution; I think, also, the usual habits of life among females of this generation, and their modes of dress, contribute much to the formation of spinal curvature.

Habits.

The habits of females in those stations of society in which lateral

SECTION I.

curvature is most commonly observed, is, for the most part, comparatively sedentary; while, in the lower ranks, the muscular exertion which is made in bodily labour, brings the female, in this station of life, nearer in this respect to the habits of the male, and consequently, lateral curvature is far less frequently met with among them than among the daughters of gentlemen and others of a higher grade.

Dress.

The dress, also, in the higher classes, has a powerful influence upon the development of the female figure. Tight lacing, unaccompanied with due muscular exertion, is productive of much injury to the muscles of the chest and spine, and it may be, in certain cases, that this effect is produced more in some muscles than in others; and when a difference in the power of antagonizing muscles has taken place, from whatever cause it has arisen, the practice of wearing low bodied dresses assists greatly in establishing deformity, particularly in the upper or dorsal portion of the spine, where lateral curvatures most commonly commence. This form of dress, and other habiliments made tight about the shoulders, produce, especially during various movements of the arms, a mechanical action upon the upper part of the trunk, which is unfavourable to its natural line, and consequently they may be regarded as assisting the deforming process; the progress of which is more or less rapid in different persons, according to the state of their health, their strength, their habits and manner of dressing.

Number and extent of curves.

The number and extent of the curves, when unaccompanied with disease, vary very much in different cases. Sometimes the whole spinal column is formed into one large curve, as is seen in Plates XIX and XXV, Figures 42, 54. Sometimes there are several curves, projecting in opposite directions, as in Plates XXI, XXIII, Figures 45, 46, 49, 50. Sometimes the curvature occupies the upper part of the spine, principally, as is seen in Plate XVIII, Figures 39, 40. Less frequently, the principal curve is in the lower part of the spine, as in Plate

VII and VIII, Figures 13 and 15. Now and then the deepest curve is formed by the neck and head, as in Plate X, Figures 21 and 23.

With torsion of the spine.

Lateral curvature is also frequently further complicated by a spiral twist of some of the bones of the spine; so that those parts of the bones which naturally project towards the front of the body, become turned round out of their natural bearing, and present more or less towards the side. In many of the cases described in this work, this very complex kind of deformity is manifest.

Commencement.

Lateral curvature is found to occur in the period of infancy, at all periods during the growth of the body, and also after the growth of the body has ceased, but it begins to show itself most frequently from the age of eight to eighteen. When this deviation has once commenced, it proceeds in a very insidious manner, and more or less rapidly according to the state of the general health and strength of the individual, and other circumstances. In the case of the lady described in Plate I, Figure 1, the deforming process commenced when she was about nine years of age, and it continued in the incipient stage until the time of my seeing her, which was about four years after it was first observed. In this case the deforming process proceeded for four years very slowly. In Plate XVII, Figure 38, is represented the state of a lady at eighteen years of age, in whom the deformity was first manifest when she was about ten years old. In Plate XX, Figures 43 and 44, is shewn the condition of a lady at seventeen, in whom the deforming process commenced at eleven years of age; previous to this period, her figure was remarkably good. In this case, the deforming process proceeded very rapidly.

Rarely from disease.

Sometimes lateral curvature arises from diseased action in the bones of the spine, or in the substances by which they are connected, but such instances are comparatively rare.

Bones of the chest become deformed.

It generally happens that deformity of the bones of the chest commences soon after the curvature of the spine has become manifest,

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and the deformity of these parts increases with the increase, and is commonly proportionate to the extent and duration of the spinal deviation.

When does the deforming process cease?

It is commonly supposed that when the growth of the body has ceased, deformity of the spine will make no further progress; but this is far from the truth. If the deforming process be not checked by the operation of remedial means, it proceeds even to the latest period of life, and its progress is more or less rapid after the age of twenty, according to the state of the health and strength of the body. In married women it commonly increases most rapidly after the birth of every child, as in Case 36. This happens not only in those in whom the deformity commences during the growth of the body, but also in those in whom it commences after this period. See Case 34.

Distress of mind and body.

Persons afflicted with deformity are frequently irritable, and are sometimes disposed to seclusion and melancholy. These conditions of the mind are frequently induced, in a great measure, by the mental distress which deformity occasions. The effects of deformity of the spine upon the nerves, muscles, and internal organs of the body, also produce a powerful influence upon the health and temper of the sufferers, see Cases 11, 21, 22, &c. The deformity itself gradually destroys the ease, the health, the happiness, the prospects, and the pleasures of the persons in whom it exists. Having witnessed the distress, bodily and mental, which often arises from the existence of deformity, I would press upon the friends of those who are thus afflicted, not to regard with apathy the manifestation of this growing evil in their offspring.

Not to be neglected.

There is at present an inclination in the minds of many to neglect these cases, or, in other words, to leave them to the course of nature. This has been in no small degree fostered and increased by the counsel of medical men, who, from their knowledge of the inadequacy of the usual modes of treatment, have encouraged the friends of the afflicted to leave these cases to the powers of the constitution, which they en-

deavour to strengthen, in the hope that by such a course of proceeding the deforming process might cease, and the distortion be diminished, and ultimately removed; but this hope is too often found fallacious, and instead of a cessation of the deforming process, they have found it steadily progressing, till at last the deformity has become one, with the bones altered in form, and sometimes firmly fixed in a condition far beyond the reach of remedies, as in Case 33. SECTION I.

These observations will come home to the hearts of some of my readers, with a force and poignancy which it is not easy to describe. At a time when the plans of treatment resorted to did not produce the desired relief, such counsel was excusable; but now that we have, by the mercy of God, further light and knowledge in the management of deformities, &c., such conduct on the part of medical men would not only be highly reprehensible, but cruel in the extreme.

Of the Prevention of Lateral Curvature.

WHEN there is any claudication from deformity, contraction, or distortion, in either or both of the lower limbs, this evil should be as far as possible removed. If there be a difference in the length of the lower extremities, the difference should be made up by artificial means. Lameness to be corrected.

The use of the ordinary stays, which act unfavourably to the natural development and form of the body, should be avoided. The ordinary stays not to be worn.

Dresses which are made so as to fall off the shoulders should be discontinued; and great care should be taken not to allow other parts of the dress to be tight about the chest and shoulders. This should be specially observed by those who have the charge of growing children. Care in dressing,

The habit of standing on one leg should not be allowed; neither any awkwardness in sitting or walking. In standing, &c.

SECTION I.

In sitting.

The practice of confining children, for hours together, on forms without backs, as is the custom in many schools, is pernicious; and should not be permitted. Children should rest the muscles of the spine, by leaning against the back of the seat when they are tired from exercise or sitting. It is not judicious in parents and governesses to require children to sit at all times without leaning against the back of the seat. The muscles of the back become fatigued by exercise as well as the muscles of the extremities, and they require a corresponding degree of relaxation by rest, that their diminished energy may be repaired, and that their force and functions may not be injured.

Functional derangement.

Diseases affecting the constitution, as common fever, and the various complaints to which children are especially liable, frequently leave functional derangement in some part of the nervous system. When this takes place in any of the nerves which supply the motive energy to the muscles, there may be loss of the balance of power between antagonizing muscles, and a consequent tendency to deformity. Care should therefore be taken to use all proper means, local and general, to remove the functional derangement in the nerves, and to restore the balance of power in the muscles. Such medicines as the state of the system may indicate should be given, and at the same time the weakest parts should be rubbed and manipulated, and, if necessary, further stimulated by the application of external irritants. The most powerful restorative, however, in connexion with any or all of these means, is the author's Exercising Plane. It is necessary in all such cases to be especially careful to prevent deviation of the spine while the muscles are being restored to their natural tone and vigour; and for this purpose, the author recommends the use of his Patent Body Support, in any of its various forms, suitable to the circumstances and condition of the body.

Weakly children.

In the children of deformed parents, there is often a peculiar tendency to lateral curvature, arising from a hereditary delicacy of

constitution, and laxity of the soft parts. In such cases, especially, the system should be well supported. A generous diet should be prescribed, and free exercise, partly in the open air, with the occasional use of tonic and alterative medicines. Where support is desirable, the author's Patent Body Support should be used. The employment of his Patent Exercising Plane is particularly serviceable in such cases.

Effects of the Author's Plane,

By the judicious use of this Plane the whole of the muscles of the trunk and extremities are brought into due exercise, and their strength and development are thereby greatly increased. The benefit which is produced upon the muscular system, by the employment of this Plane, is very remarkable; this is manifest in the muscles of the trunk, especially in those of the back, and also in the muscles of the extremities, as may be seen by referring to Plate XXXI. Figs. 65 and 66, and the Case which these figures illustrate. The tendency of the exercises performed upon this Plane, when properly regulated and adapted to suit the constitution and condition of the patient, is to stimulate the nerves, to expand the chest, to remove the stoop arising from weakness, and to produce the natural position and symmetry of the body. By increasing the tone and strength of the muscular apparatus, they tend to prevent the occurrence of lateral curvature, which is seen in various forms in the Plates, from Plate II. to Plate XXIII., and of excurvation, which is seen in Plate XXIV. Fig. 52, and in a more advanced state in Plate XXV. Fig. 54.

Upon the nerves and muscles,

Upon other parts.

I have observed that the exercises exert also a very beneficial influence upon the stomach and other internal organs; increasing the appetite remarkably in most cases, and removing obstructions in females, and also, sometimes, the pain which is experienced at particular periods, as in Case 11.

Not to be used indiscriminately.

It is proper to remark here, that all persons could not use the Plane with equal advantage, or even with impunity: it is therefore necessary that the opinion of a competent medical person should be taken before

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the exercises which I recommend be had recourse to; and when they are commenced they must be carefully regulated, in order that the patient may derive all the advantages which they are capable of affording.

STAGES OF LATERAL CURVATURE.

State of the Parts, and the Author's Treatment in Incipient Lateral Curvature.

Division of Lateral curvature.

CURVATURES, unaccompanied with disease in the spine, might be divided, for the sake of facility of description, into three stages. The first stage includes incipient curvature; the second, curvatures in which the bones have become fixed in their new positions; and third, curvatures accompanied with such a degree of deformity and contraction of the chest as will not admit of the reduction of the curves.

First easy to reduce.

The first or incipient stage includes cases of spinal deviation, in which there is no alteration in the figure of the bones of the spine or chest, nor any fixed state of the curves. The curvature in these cases may be sometimes reduced by simply taking off the superincumbent weight of the body, or by a slight pressure of the hand, when the body is placed in the inclined or horizontal posture; but as soon as the pressure is removed, and the superincumbent weight is allowed to bear upon the spine, the parts fall again into their previous position.

State of the parts.

In this stage there is commonly loss of the balance of power in the muscles; some one or more being deficient in energy. The ligaments gradually become elongated whenever they are put upon the stretch by the operation of the superincumbent weight; and the curvature increases. more or less rapidly, according to the degree of difference in

the strength of the antagonizing muscles, the yielding of the ligaments under the operation of the force applied to them, the general health and strength of the individual, and other circumstances which may either tend to retard or facilitate the formation of curvature.

Treatment modified.

During my investigation of, and my practice in, the management of lateral curvature, I have found that these cases require modifications in the treatment, according to the state of the health, the condition of the spine, chest, and other parts.

Means employed.

In the management of incipient curvature, arising from muscular weakness, or from the loss of the balance of power in the muscles of the trunk, I commonly have recourse to the use of my Patent Exercising Plane, for the purpose of strengthening the system, and to assist in removing the curvature. The effects of the exercises upon this Plane, in connexion with position and manipulations, are sufficient, in most cases, to give tone to the body, and to restore the spine to its natural figure. The benefits derived from this plan of treatment are illustrated by Cases 5 and 6, Plate I., Figs. 1 and 2.

CASE 5.

PLATE I.—Figure 1, *Represents the Back as it was restored by the Author's Treatment.*

Miss ———, æt. 14, was brought to me from Leeds, by the recommendation of the Reverend Mr. Bromby, of Hull, with incipient lateral curvature of the spine, accompanied with out-knee and weakness of the arches of the feet. The deformity of the spine commenced about two years before I saw her, and had been gradually increasing during this time. She was born a healthy child, and continued so until she was about four months old, when it was supposed she had been injured by some accident, as a black mark was observed upon the loins. From this time she became weak and feeble, and the joints of the

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lower extremities soon began to give way. I found her thin and delicate, with much deformity of the lower limbs, which will hereafter be more particularly described. There was a rickety disposition manifested by general weakness of the joints, and enlargement of the ends of the bones of the fore-arm. The curvature of the spine was of the description seen in Plate V. Fig. 9; but the deforming process had not proceeded so far as in the case represented in that figure.

Her father placed her in one of my private Orthopedic Establishments, where she used my Patent Exercising Plane, and had the back manipulated daily. She soon began to improve in the condition of her health. Her temper, which was irritable, became more docile; the muscular strength gradually increased; the curvature of the spine was reduced; and, in about four months, her back was straight, as is seen in Fig. 1, and her muscular system was strong, and her general health good. She continued in my Establishment for about five months longer, on account of the condition of her limbs, which were not yet brought up to their natural line (see Plate XXX.), and continued her exercises upon the Plane, for the purpose of maintaining the health and strength of the body. Her back is now remarkably straight, muscular, and strong.

CASE 6.

PLATE I.—Figure 2, *Shows the Appearance of the Back after the Curves were reduced.*

Miss ———, æt. 13.—I was consulted respecting this young lady, in September, 1838, in consequence of an incipient curvature of the spine. Her health had been good, and the deformity could not be traced to any particular complaint. There was at this time a double curvature of the spine in the incipient stage, with some consequent deformity of the chest. The curvature was noticed four years before

I saw her; but its increase was slow, as it had not passed beyond the first stage in the course of four years. SECTION I.

She was recommended by the medical attendant of the family to assume the inclined posture for a short time daily. This plan was irregularly continued for two years, without any apparent advantage. She was now recommended to wear elastic stays, which she continued to use until I saw her.

I advised the use of my Patent Exercising Plane, suitable positions, and manipulations of the affected parts; the case not requiring, in my judgment, the use of my Patent Spine Support. This plan was adopted, and she was consequently placed under my care. An improvement in her figure very soon became manifest. I continued in regular attendance upon her for about ten weeks, and at the end of this time the back was brought into the condition seen in Fig. 2. The balance of power in the muscles was not quite restored, but the difference in the degree of power on the two sides was very trifling. She was much improved in her general appearance and in her bodily strength. I recommended her parents to allow her to continne the exercises some time longer.

These two cases, with several others of the same description, are illustrative of the beneficial effect produced by the proper employment of my Patent Exercising Plane, in connexion with manipulation of the affected parts. Remarks.

It has been said by persons of high professional reputation, that in slight cases of curvature, it is well to attend to the general health, without having recourse to means which in any other respect would influence the condition of the Spine. This counsel is given under two considerations; one is the hope that attention to the general health, with exercise in the open air, will produce a favourable effect upon the Spine; and the other is, that the modes of treatment commonly resorted to, have rarely been found successful; while, at the same time, those that have been most approved are not unaccompanied with

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additional danger to the general health, by tending to lay the foundation of disease.

I am fully aware of the great importance of attending to the general health in the management of spinal distortion; but I have never yet seen this, with all the assistance that can be derived from country air and exercise, sufficient for the reduction of the curves; but, on the contrary, according to my experience during months, or even years, spent in seeking relief in this way, the curvatures have continued to increase more or less rapidly; and at last the sufferer finds himself with a bad and increasing deformity, more or less similar to some one of those of the persons whose cases will be stated in this work, and represented in the following figures. I think, therefore, that in the present state of our knowledge, it would be trifling with the minds, and with the bodies, and with the prospects, of persons in whom spinal deviation has commenced, to induce them, by our counsel, to trust to the influence of strengthening medicines, and country air and exercise, seeing that it is a practice which is found daily fallacious. The more preferable plan most certainly is, to have recourse to such a mode of proceeding as is found calculated, not only to be beneficial to the general health, but also to act favourably upon the spine; and I have observed that these two desirable objects are brought about by the plan of treatment which I have introduced, and as will be abundantly proved in the following pages.

Though I have stated that, in cases of incipient lateral curvature, the Patent Exercising Plane, with manipulations, positions, &c., is found commonly sufficient for the restoration of the Spine, there are cases in which the curves have proceeded to a considerable extent, and yet remain in what I have called the first stage; for the removal of such curvatures it is necessary not only to bring up the Spine to its natural position, but also to sustain it there for a time, by the same means as in cases in the second stage of curvature, of which I shall speak in the next section.

State of the Parts, and the Author's Treatment in the Second or advanced Stage of Lateral Curvature.

SECTION I.

State.

As the deforming process proceeds, the bones of the spine and most commonly also of the chest, become gradually altered in their form, and the unnatural curves of the spine become relatively fixed in such a manner, that any pressure of the hand that might be prudently applied, will not at once remove them. This state of the parts I have called the second stage of curvature.

Alteration in the form of the bones.

In this condition of the spine, those parts of the vertebræ most pressed upon, gradually yield to the superincumbent weight, and the bodies of some of the vertebræ assume a wedge shape, the thickest parts being towards the convex sides of the curvature. The vertebræ are frequently twisted upon each other in a spiral direction, so that the bodies of the bones are turned towards the convex, and the spinous processes towards the concave parts of the curvature. When this alteration takes place in the position of the vertebræ to which the ribs are attached, the ribs at their vertebral ends are turned obliquely backwards on the convex side of the curve, and on the other side forwards. On the convex side, owing to this arrangement, the ribs form a hump, projecting more or less backward as is seen in Plate XXIII., Figures 49 and 50, and Plate XXV., Figure 53. The angles of the ribs by an alteration in their figure, which takes place during the deforming process, are sometimes projecting backwards so far as to cover the spinous processes of the vertebræ, and to be mistaken for them. See Plate XXI., Figure 45. Sometimes the ribs projecting backward, in this manner, are bent suddenly upon themselves, and proceed from the spine towards the sternum, very close to the bodies of the vertebræ, on the convex side of the curve, making this side of the chest nearly flat; whilst on the concave side the natural convexity of the ribs is gradually diminished, and they become elongated and straightened from their vertebral ends to the sternum. See Plate XX., Figures 43 and 44.

Pain not

In most cases of lateral curvature, there is not any pain complained

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constant.

of in the course of the curves, except an occasional aching, accompanied with sensations of weakness and sinking. Commonly there is no tenderness on pressure. Sometimes, however, the sensitiveness of the spine, in the line of the curves, is exceedingly great, from which circumstance, cases of lateral curvature have been mistaken for cases of disease in the bones of the spine, and treated accordingly with blisters, issues, setons, &c.

State of health—internal organs suffer.

At the commencement of lateral curvature, the health is but little deranged by it; but, after a time, the various internal organs of the body suffer a change of form, corresponding to the degree of deformity of the spine and chest; or are pushed out of their natural bearings in respect to one another. In consequence of this they experience more or less impediment in the performance of their functions, and the derangement of the health is usually more or less distressing, according to the degree of injury which they have sustained.—Some of the muscles become enlarged, others diminished in size and power. In some very bad cases, the heart is relatively displaced, the lungs have not room to become fully expanded, the large vessels are more or less unnaturally curved, the ligaments on one side are preternaturally shortened, and the vertebræ assuming a cuneiform shape laterally, alter the figure of the canal formed in them for the spinal marrow. The spinal marrow is often diminished in size about the centre of the curves. The nerves issuing from it are smaller on the concave than on the convex side, and the organs which the smaller nerves supply are consequently weakened in their functions.

In very bad cases there is palpitation of the heart, the lungs are filled with difficulty, the blood is imperfectly airated, and therefore less fit for the purposes of life. The patient suffers from indigestion, loss of appetite, head-ache, constipation, and, sometimes, irritation of the urinary organs, with frequent propensities to void the urine. The irritation of the spinal marrow is communicated to the nerves proceeding from it, and various nervous symptoms and feelings are

induced; in young females histeria sometimes takes place, lassitude, with painful or suppressed menstruation; many experience great dejection of spirits, partly occasioned by the unnatural form of the body, and partly by the state of the health, and often from the feeling of despair, which arises from the apprehension that their cases are beyond the reach of remedies.

The parts yield to treatment in youth.

When this condition of the spine, chest, and internal organs, has supervened in consequence of the long continuance of the deformity, a much longer period is necessary in order to bring the spinal column to its proper line, and to restore the bones to their natural figure, but the improvement obtained during the growth of the body is for the most part rapid and certain, differing, however, greatly in different cases, in the length of time required for restoration; the difference being regulated by the degree of progress which the deforming process may have made, the condition of the parts, the natural strength of the patient, the state of health, and other circumstances which may tend to assist or retard the restorative process.

And after growth has ceased.

It is also very gratifying to be able to state that, not only persons whose cases have attained the second stage, may obtain relief during the growth of the body, under the plan of treatment which I have been enabled to introduce; but likewise persons who have passed the period of growth in a state of deformity, may be greatly benefitted by the use of the same means. In such persons the restorative process is commonly less rapid than in those who come under treatment in youth, but still it is progressive and very satisfactory; see Cases 11, 12, 13, 14, Plates VI., VII., and VIII.

Spiral twist the most difficult to remove.

I might here mention that in cases where lateral curvature is further complicated with a spiral twist of the spine, it commonly happens that the lateral curvature is first reduced. The spiral twist yields to treatment more slowly, and when accompanied with much distortion of the spine, it is often very difficult to remove.

The

In cases where the deforming process has gone on to the second

SECTION I.

Author's treatment.

stage I make use of my Patent Spine Support, in connexion with my Patent Exercising Plane, and such other means as the state of the parts may indicate. The objects which I seek to obtain by the use of these means are, to sustain the bones in that relative position into which they are brought from day to day, in order that the spinal column may be gradually restored to its natural form; and at the same time to increase the tone and strength of the muscles generally, and especiallythe muscles of the trunk.

The Patent Spine Support, and Patent Exercising Plane, produce, together, very favourable effects upon the Spine; their operation, however, requires to be carefully regulated, and accommodated to suit the strength of the patient, the state of the curves, and the condition of the spine. The beneficial effects of the Spine Support are well illustrated by those cases where it has been used without the Plane, as in Case 35, Plate XXI., Figure 45, compared with Figure 46, and in Case 36, Plate XXII., Figure 47, compared with Figure 48, &c. The utility of the Patent Exercising Plane, as a means for strengthening the muscles of the trunk, and for the removal of spinal curvature, is well illustrated by Cases 5 and 6, Plate I., Figures 1 and 2; its effect, however, in increasing the strength and natural development of the muscular system is best seen in the extremities, and is well shown in the limbs represented in Plate XXX., Figure 63, compared with Figure 64.

The use of the support as a guard.

In cases of curvature which require the use of the Patent Spine Support, for curvative purposes, it is necessary, even in the most favourable instances, after the curves have been reduced, that the Support should be constantly worn, for an indefinite period, the length of which should be regulated by the strength of the person, the peculiar condition of the parts, and other circumstances. Restoration is not fully accomplished as soon as the spine is brought to its natural position—there must then be time allowed for the bones to assume their natural form, and the ligaments their natural tenacity and length.

To be worn

These effects gradually take place in the course of the changes

as long as may be necessary.

which, it is well known, are constantly going on in the body at all periods of life, but in a more especial manner during its growth. Until these alterations have taken place, in the bones and in the ligaments, it would not be safe to discontinue the use of the Support. After the curves have been reduced, it must be worn as a guard to steady the bones in their relative bearings upon each other; and to prevent deviation until the parts have become properly adapted in their natural relations, and have therein acquired strength and firmness; and, until the muscles are sufficiently restored to sustain the spinal column correctly, under all the various inclinations and movements which it is required to perform. The time necessary for the accomplishment of these purposes, differs greatly in different cases. The surgeon should bear in mind that the support must be left off gradually, and with great caution. After it has been worn for a time, night and day, for the reasons I have mentioned, it must still be worn by day until the parts are capable of bearing the superincumbent weight with safety; and then it might be discontinued altogether, and my "Patent Body Support" should be substituted and worn instead of common stays.

In all cases.

There are cases in which the Spine cannot be fully brought up to its natural position, but in which the curves allow of being considerably reduced, and the state of the health, and figure of the patient greatly ameliorated;—there are others, in which the natural line of the spine may be recovered, but in which the muscles have become dwindled, and can hardly be expected to recover their full balance of power. In these cases, whether the spine be restored altogether or in part, in order to keep up what has been gained by treatment, it is necessary for the patient to wear the Support, night and day, for a time, and afterwards it must be worn as a guard by day, in some form suitable to the varying conditions of the body, in the single and married state. If these regulations be not carefully attended to in the use of the Support, evil will probably ensue. The operation of the

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Support is positive, and if it be mismanaged or left off too early, the patient will suffer from weakness, and is in danger of returning deviation—the deforming process might be again established, and the deformity, with all its fearful consequences, might attain to a degree of severity, equal to that which would have taken place had nothing been done for the restoration of the parts.

I might here state, that when the Support is worn simply as a guard, it tends to sustain the natural appearance of the figure, and is found more comfortable in use than any of the ordinary stays.

Plane to be used.

It is also proper to continue the use of the Patent Exercising Plane, for a time, the length of which should be regulated by the circumstances attending every case. This should be done with the view of keeping up and increasing the strength of the muscles, which might otherwise suffer loss in tone and power, in consequence of the spine and chest being so effectually sustained under the operation of the Patent Spine Support.

Every case will not yield to treatment.

I would here observe further, that it is not every case of curvature arising from weakness, whether lateral or otherwise, that will yield to treatment in any considerable degree. There are some for which even, during the growth of the body, but little can be done for the restoration of the parts. In such instances as that seen in Plate XX., Figures 43 and 44, the chest is so much contracted, and the internal organs have suffered so severely from the deformity of the spine and ribs, that those means which are found so successful in other cases can be used in these with but little benefit.

CASES OF LATERAL CURVATURES OF THE SPINE IN THE SECOND STAGE, *Showing the Progress of Improvement at different Periods after the Treatment was commenced.*

CASE 7.

PLATE II.—Figure 3 *Shows the unimproved State of the Patient.*

Figure 4 *The improved State after Two Months' Treatment.*

Miss ———, æt. 12, was brought to me with a double curvature of the spine as seen in Figure 3. The lower curve allowed of easy

reduction by the hand, but the bones forming the upper curve had become more relatively fixed in the deformed position. The lower part of the chest inclined backward on the left side, and the upper part on the right. The ribs on the right side were altered in their shape, their natural curve having become diminished. Her health was good, her disposition very active, and her constitution robust. The spine began to yield to the superincumbent weight about five years before I saw her; and about four years previous to the time of my seeing her, there was a fulness of the right shoulder observed, but the spine at this time was but little curved. About six months before I was consulted she was ordered by her medical attendant a crutch-support. This was made for her, but she did not wear it more than about three months. She felt comfort from the use of the support. During the last six months, however, the deformity increased rapidly; and it appeared that its progress was rather facilitated than otherwise by the employment of this apparatus.

She was placed by her parents in one of my private Orthopedic Establishments, and was ordered my Patent Exercising Plane, which she used under my directions, and shortly after she had one of my Patent Spine Supports. These means, in connexion with daily manipulations of the affected parts, were regulated, from time to time, according to the increase of her strength and the alteration which took place in the form of the chest and spine. Her muscular strength has increased rapidly under the employment of these means, and the unnatural curves in the spine have been greatly reduced, so that in the course of two months, from the time of the application of the Patent Spine Support, the change produced was very remarkable, and which will be seen by comparing Figures 3 and 4. Figure 3 represents the appearance of the back when she was admitted into my Establishment, and Figure 4, the improvement which had taken place in about two months under the operation of the means employed. She is

SECTION I.

still in the Establishment, under the influence of the same plan of treatment.

Remarks.

This case is illustrative of the rapid improvement produced in the figure of the body when the deformity has not been permitted to continue so long as to allow the parts to become strongly fixed in their new positions. The length of time required to produce a corresponding effect upon the spine, in cases of lateral curvature of this description, is commensurate with the relatively-fixed condition of the bones, the degree of deformity which has been allowed to take place in them during the progress of the deforming process, the age of the patient, the health and other circumstances which may tend either to retard or facilitate the removal of the curvature. It might be inferred, as a general rule, that the earlier the plan of treatment which I advise is commenced, the more speedily will the natural figure be restored.

CASE 8.

PLATE III.—Figure 5 *Represents the unimproved State.*

„ 6 *The Improvement produced in Three Months.*

Miss ———, æt. 18, the daughter of a surgeon, was brought to me by her father, in consequence of a spinal deviation, which commenced about five years before I was consulted. Two years after its commencement she was placed under the care of the late Dr. Harrison, and was submitted to his plan of treatment for three months. She was required to maintain the horizontal posture, and was not permitted to rise for any purpose whatever. She was rubbed every morning for an hour, and while this was being done the body was stretched by the assistance of a windlass. She was improved in her figure by this practice, but she found it so irksome that she could not prevail upon herself to submit to it any longer. When she came to me the spine had assumed its former line, and the back presented much the same appearance as when she was first placed under Dr. Harrison's care.

The curvature is now double; the upper curve is short, and projects towards the right, producing a projection of the ribs and shoulder, as seen in Figure 5; the lower curve produces a considerable projection of the left and lower part of the chest, which is but little seen in the drawing. Her figure is of the middle size, and in other respects she is well proportioned. Her health is good, and her disposition active.

She was placed in one of my private Orthopedic Establishments, and there submitted to my usual plan of treatment. She used my Patent Exercising Plane for a short time, and then had applied, under my direction, my Patent Spine Support. The affected parts were manipulated daily; the exercises and the Patent Spine Support were regulated from time to time, according as the strength of the body increased and as the curves became reduced. She was allowed a generous diet, and free exercise in the open air. Under the operation of these means she improved rapidly. She was raised upwards of an inch by the reduction of the curvature; and in the course of three months her figure was brought into the condition represented in Figure 6. She now left the Establishment, with directions to continue the use of the Patent Exercising Plane, and Patent Spine Support, under the superintendence of her father, and to come to me about once a month.

Remarks.

The curvature in this case had passed into the second stage, but had not become so firmly fixed as in many cases of similar duration. The deformity readily yielded to the influence of the means employed; and she was, in the course of three months, so far restored as no longer to need my constant attention. It is no trouble to her to continue the use of the Support for a time, as she finds it more comfortable than the ordinary stays.

CASE 9.

PLATE IV.—Figure 7, *Shows the State of the Back when the Patient came for advice.*

„ 8, *Represents the effects of Four Months' Treatment.*

Miss ———, æt. 14, a weak and delicate girl, was brought to me, from the country, with a double lateral curvature of the spine, in the second stage, which was first noticed when she was about ten years old. Upon examination, I found the right side of the chest projected to the right, producing an elevation of the right shoulder; the lower part of the chest projected to the left, and the nates to the right, in the manner seen in Figure 7. She felt pain after walking, directly below the shoulder blade, in the projecting part of the right side, and also at the lower part of the spine, where the spine was thrown considerably forward. I was not able to trace this condition of the spine and chest to any cause except the delicacy of the system, in which might have supervened a loss of the balance of power in some of the muscles of the back.

This lady was submitted to my usual plan of treatment, in cases of lateral curvature, commencing with the use of my Patent Exercising Plane. In the course of a few days I applied my Patent Spine Support, and attended her regularly, adapting the exercises and the bearings of the support, from time to time, to suit the improving figure of the trunk. Her strength gradually increased, and her improvement soon became manifest. She was raised about an inch by the reduction of the curvature; and in the course of four months she was much stronger than when she came under my care; and her health, which had previously been delicate, was now good. The degree of improvement in her figure which had taken place at this time is represented in Figure 8.

I attended this lady at her private residence, and I have no doubt that the progress of her improvement was much hindered by the many little interruptions which she experienced in the family. Had she been placed in one of my Establishments, it is probable that the benefit derived, and which is represented in Figure 8, would have been effected in a much shorter period.

CASE 10.

PLATE V.—Figure 9, *Shows the extent of deformity.*

„ 10, *The improved State after Four Months' Treatment.*

Miss ———, æt. 15.—I was consulted respecting this young lady in 1837, in consequence of the existence of a curvature in her spine. I found, upon examining the back, a large curve, which involved the greater part of the spinal column, projecting to the right side, with a short curve, at the base of the neck, projecting to the left. The hips also projected to the left. The spine was twisted so as to cause the right side of the chest to project considerably backward, and the left side unnaturally forward. The bones were not strongly fixed in their unnatural position, but allowed of being moved considerably towards the natural line by the pressure of the hand.

The curvature, as seen in the representation Figure 9, was first noticed about four years before I saw her, in consequence of the projection of the right shoulder; her health was at that time good, and the deviation of the spine could not be traced to any particular weakness or disease. She was allowed free exercise in the country, but the curvature continued to increase. She was sent to the sea and was ordered strengthening medicines. She became more robust, and it was thought some little improvement was produced in the spine, but this was of short continuance.

She was placed under my care, and used my Patent Exercising Plane for about a fortnight, and then she had also the use of my Patent

SECTION I.

Spine Support. She continued the Exercises and the use of the Support, and had the deformed parts manipulated daily, for about four months. She was allowed a generous diet, and free exercise in the open air. She was raised in the course of a short time one inch by the reduction of the curvature. Her strength increased considerably, and her health continued good. Under the influence of these measures her figure gradually improved, and she was brought, in the course of four months, into the condition seen in the drawing, Figure 10. She was now so far recovered, that I advised her father to remove her from my Establishment to his residence in the country, where she was to continue the Exercises and the use of the Support, in order to keep up the strength of the muscular system, and to steady the spine in its more natural position during the strengthening process. She comes to me occasionally, and still continues the Exercises in a modified degree, and wears the Support, to which she has no objection, as she states it is more comfortable than the ordinary stays.

CASE 11.

PLATE VI.—Figure 11, *Represents the degree of Deformity.*

,, 12, *Shows the Improvement produced in Five Months.*

Miss ———, æt. 19, came to me with a double curve in the spine, which is represented in Figure 11. The upper curve was the largest, and projected considerably to the right, forcing out the ribs, and causing them to project backwards and to the right side. The curvature was at first noticed when she was about ten years old. When I was consulted, it had passed into the second stage. She was naturally a weakly child, but had not been the subject of any particular illness for a considerable period before the curvature commenced. She was growing fast at the time when the deviation of the spine was first observed, but her health continued good. About two years before I saw her, she began to feel weakness in the back, and pain, especially in the project-

ing part of the right side. Her health now became indifferent, and for some time before I saw her it had been gradually getting worse. She was subject to indigestion and pains in the head, and before the usual relief of the system, she suffered great pain around the lower part of the body. This pain recurred with great severity at the regular intervals and lasted about thirty-six hours. The knowledge of the state of her back had a great effect upon her mind, and she was frequently low and desponding, considering her case to be without remedy. Nothing had been done before I saw her for the purpose of restoring the natural figure of the back and chest.

She became a patient in my private Orthopedic Establishment, and I ordered for her my Patent Exercising Plane, which she used for a short time, and then I applied my Patent Spine Support. I attended her daily. She soon began to improve in her health, and became gradually stronger in body; her appetite improved; the indigestion gradually subsided; the severe pains which she had suffered periodically, left her; the low and desponding feeling under which she laboured was entirely removed, and she became more cheerful and happy. The figure of the body gradually improved, she was raised by the reduction of the curvature about one inch, and at the expiration of four months was sufficiently recovered to leave the Establishment. The state of her back about a month after she left the Establishment is represented in Figure 12. While she was in the Establishment she was ordered a generous diet, and was allowed free exercise in the open air.

CASE 12.

Miss ———, æt. 23, applied to me in February 1838, for my advice respecting the state of the spine, in which she had a curvature of the description seen in Plate XVI., Figure 36, but the deviation had not,

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proceeded so far as in that case. The upper curve was the largest, and was accompanied with a projection of the chest, backward on the right side, and with deformity of the ribs. The upper curve had passed into the second stage, not allowing of reduction with the hand. The curvature was first noticed about six years before I saw her, and came on without any evident cause, except it might be attributed to tight low-bodied dresses which she was in the habit of wearing. She was at this time growing fast; her constitution was strong, and her general figure was pronounced to be remarkably good: her habits were regular, she was accustomed to take walking exercise, and her manner of life was rather active than sedentary.

I had recourse to my Patent Exercising Plane, and Patent Spine Support for her relief, and manipulated the deformed parts as in other cases. She commenced this course of treatment, and proceeded regularly for four months, and then she accompanied her mother to the country, according to her usual custom; she remained in the country about two months, and then returned to town and resumed her exercises under my direction. She continued the use of the Support during her absence, and the spine appeared to have improved, rather than otherwise, under its action. I now had recourse to other means, for the purpose of assisting in the reduction of the torsion of the spine, which accompanied the lateral curvature, and which I found rather difficult to remove. These further means consisted of paded-springs, so arranged as to produce a powerful influence upon the projecting parts, improving the figure of the chest, and bringing the ribs round into their natural relative position.

This lady has felt discomfort at times, from the means employed, but she has not suffered pain worthy of notice. In about ten months she was raised, by the reduction of the curvature, upwards of an inch, and her natural figure was so far restored, that there remained but little for me to do for her further benefit. I recommended her to con-

tinue the use of the Exercising Plane, in order to keep up the strength of the muscles, and to wear the Support for some time, which she finds easy and comfortable. SECTION I.

This case is illustrative of the beneficial effects of my plan of treatment, in persons in whom the body has ceased to grow. It also exemplifies the fact that lateral curvature takes place not only in persons who are weakly, but also in those who are constitutionally strong, and in other respects healthy and well formed. Remarks.

CASE 13.

PLATE VII.—Figure 13, *Shows the deformed, and*
,, 14, *the improved State.*

Cases of Lateral Curvature, in which the principal Curve occupies the Lower part of the Spine.

Miss ———, æt. 25, came to me in consequence of a distortion of her spine which commenced when she was about thirteen years of age, and which is shown in Plate VII., Figure 13. She states that her back had been weak for years previous to the manifestation of the deformity, which was not noticed till she was about thirteen. She suffered pain in the right side, in the region of the liver, from the time the curvature was first observed, and which continued to increase with the increase of the curvature. She felt pain between the shoulders, which commenced when she was about seventeen, and which never left her altogether. This apparently arose from the pressure of the ribs upon the liver. After the age of twenty the deformity continued to increase up to the time of her coming under my care. In consequence of the great opposition which she met with from her friends, and from medical advisers, she was not permitted to

SECTION I.

come under my professional management for about three months from the time I first saw her; and during this period of delay, it appeared to me that the distortion had increased greatly. The opposition which was made to her solicitations did not arise from any knowledge of my plans of treatment; but from the expectation that nothing could be done which would in any way be likely to prove beneficial, and from the apprehension lest she should suffer in the attempts which might be made to reduce the curve. She suffered very much from indigestion, headache, and bodily weakness, which were probably kept up in a great measure, by the knowledge of her apparently hopeless condition, which preyed upon her spirits greatly, and from the pressure of the ribs upon the liver.

At the age of fourteen her parents had recourse to the use of an apparatus, similar in effect to that recommended by the late Mr. Cheshire. She wore this about twelve months without any apparent benefit, and it was consequently discontinued. The curvature continued to get worse, notwithstanding the operation of the apparatus. The pain which she had begun to experience between the shoulders at seventeen, and which probably arose from the pressure of the deformed ribs upon the liver, soon increased considerably, and medical advice was again had recourse to. Her medical attendant ordered a shower-bath every morning, strengthening medicines, and exercise in the open air, with weights in her hands. He also recommended her to lie upon the floor six hours daily, but, according to his statement, not with the expectation that these means would operate in any way so as to reduce the curvature. He said that nothing could be done which would be likely to relieve her in this respect. This course of treatment was followed for about a year; and she felt somewhat strengthened by it, but the deformity continued to increase. Her friends, from all that they had heard and seen, now felt that it would be useless to try any further means with a view to relieve the deviation

of the spine; the deforming process was, therefore, from this period, left to take its course. When she was about twenty-one, she became very subject to colds and coughs, and her health was so indifferent, that for the next four years she scarcely passed a day without taking medicine.

She placed herself under my care in one of my Establishments by the permission of her mother, and for about sixteen weeks she has been seen by me almost daily. I had recourse to my Patent Exercising Plane first, and after a short time applied my Patent Spine Support. I regulated the exercises according to her strength, and manipulated the parts, and also regulated the operation of the Support from time to time, as the state of the deformity required. I ordered some gentle aperient medicines, and some concentrated decoction of sarsaparilla, of which she took a teaspoon-ful three times daily in cinnamon water. She soon began to improve in health; the digestion became more natural; the headache left her almost altogether; after the expiration of about three weeks, the pain in the side wholly subsided; the pain between the shoulders was much diminished, occurring only occasionally. Her bodily strength is increased, and the feeling of despondency under which she previously laboured, has now left her, and her mind is easy and tranquil. The curvature is greatly reduced, as may be seen by referring to Figure 13, and Figure 14; in Figure 13 is seen the condition in which she was when she came under my care; and in Figure 14 is represented the condition of the back as it appears at present.

Remarks.

This case points out the beneficial influence which arises from the right use of the means employed, when the principal curvature is low in the spine, even in persons who have passed the period of growth. It will be seen that the apprehensions of her friends and of her medical advisers were perfectly groundless, as she is now so far restored, not only without injury, but has attained to an improved con-

SECTION I.

dition of health, and to a degree of tranquillity of mind, which she had not for a long time experienced. This case is not mentioned as one in which the curvature is altogether removed, but to show the great improvement which was effected in about four months. This young person is still proceeding with the same plan of treatment under my professional management.

CASE 14.

PLATE VIII.—Figure 15, *The deformed State.*

„ 16, *The improved State after Ten Months' Treatment.*

Miss ———, æt. 20.—I was consulted for this young lady in October 1837, in consequence of a deviation which had taken place in the spinal column, and which was specially manifested at the lower part of the spine, as is seen in Plate VIII., Figure 15. The deviation was first noticed in 1833, in consequence of the projection of one shoulder. From this time it gradually increased. In 1835 an eminent surgeon in London was consulted, who advised her to lie down two or three hours daily, and gave it as his opinion, that she would recover by following this plan; instead of which, however, she gradually got worse. The opinion of the late Dr. Harrison was then requested, who stated that it would be necessary, with a view to her restoration, that she should be confined in the horizontal posture for two years. Her parents were apprehensive of the consequences which so long a confinement might entail upon her health, and therefore would not allow it to be tried; and not finding any plan of treatment sufficiently encouraging, they reluctantly suffered the deforming process to take its course. She gradually got worse until I saw her in October, 1837, so that in the course of six months in this year, she became half an inch *shorter*, in consequence of the increase of the curvature. Her

health continued good, and it did not appear that the deformity was induced by any particular disease.

I recommended the use of my Patent Exercising Plane, Patent Spine Support, and generous diet, with liberty to take exercise daily in the open air; I regulated the use of these means from time to time, as circumstances required, and manipulated the parts as in other cases. She commenced this plan of treatment on the 10th November 1837, and on the 28th January, 1838, she had gained in height, by the reduction of the curvature, upwards of an inch. From the commencement of the treatment, to the 13th of September 1838, she had gained one inch and a half. From the 13th of September to the 17th of December she was found to have gained nothing in height. Being of a full habit, she lost some of her superfluous fat during the treatment, as was to be expected, but did not suffer in her health. Previous to her coming under my care she was exhausted from slight exertion; but within a month after she commenced the Exercises upon the Plane, she was able to exert herself considerably without fatigue. Her appetite continued good during the whole period of treatment, and nothing remarkable occurred in the state of her health. In the middle of July 1838, she left town and went into Devonshire, where she remained till the 13th of September, continuing to wear the Support. On her return from Devonshire she was again measured, and it was found she had neither gained nor lost anything in height during her absence. Her health continued good in the country, and she looked remarkably well on her return. Figure 16 represents the back of this lady, as she appeared about ten months after she was placed under my care.

CASE 15.

SECTION I. A Lady, fifteen years old, of very full habit, and enjoying good health, was brought to me by her mother, who requested my opinion respecting the state of her daughter's spine, in which a deviation from the natural line was observed, about six months previous. The deforming process was going on, and she was desirous that a course of treatment should be entered upon, by which her daughter might obtain relief. The young lady was in good health, and short for her age. The deformity was of the same description as that seen in Plate VIII., Figure 15; it came on gradually, and could not be traced to any evident cause.

The mother was encouraged by what I stated to her, and was induced to place her daughter under my care in one of my Establishments; where she used my Patent Exercising Plane, and Patent Spine Support. The parts were manipulated daily, and the operation of the Plane and Support was regulated from time to time, according to the increase of her strength and other circumstances. She was ordered a generous diet, and had liberty to take exercise daily in the open air.

The plan of treatment was commenced about the middle of November, 1838, and proceeded with regularly until the end of March, 1839, when she left the Establishment strong and in good health; the deformity of the spine and chest having disappeared. She continued the use of the Plane for a time in order to keep up the muscular strength of the body, and she wore the Spine Support as a guard. About fourteen months after this, I ordered for her one of my Patent Body Supports, which she now uses instead of the ordinary stays.

CASE 16.

PLATE IX.—Figure 17, *Shows the degree of Deformity.*

„ 18, *The improved State after Six Months' Treatment.*

„ 19, *Represents a front view of the Child, dressed over the Support.*

„ 20, *Is a back view as she appeared dressed, wearing the Support.*

Miss ———, æt. 14.—Miss ——— is constitutionally delicate; she had frequently suffered from indigestion, and pain in the right side in the region of the liver. She was also much troubled with palpitation of the heart.

Miss ——— was brought to me in August 1837, for my opinion respecting the state of her spine. I found a considerable deviation of the spine and deformity of the chest, of the description represented in Figure 17. The ribs were thrown in upon the liver, producing pain and tenderness in this organ. The right hip projected to the right, and the bones of the upper part of the spine in the same direction. The deepest part of the curve was about the centre of the back.

The curvature of the spine was first noticed about six years before I saw her; at that time she was living in London. About three years and a half before she came to me, she began to complain of pain in the right side. At this time she was sent into Devonshire, and an eminent surgeen in Exeter was consulted for her relief. He ordered shower-baths and friction with a flesh-brush, and also with sea-weed, and directed her to lie down one hour a-day, and to be in the open air as much as possible. The hooping-cough came on shortly after this plan was commenced, and in consequence of which the shower-bath was discontinued, the friction and other measures were followed

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up as before. The curvature of the spine, however, continued to increase, but the pain in the right side was diminished. At the end of six months, another surgeon, residing at Topsham, was consulted. This gentleman recommended sea-bathing, and directed that she should lie on the floor four hours daily, and at night on a hard straw mattress. Friction on the back with sea-weed, ordered by the surgeon previously consulted, was to be continued. This plan was also followed for about six months without any alleviation of the deformity. At the end of this time she went to Aston near Exeter, where another medical man was consulted. This surgeon recommended a perpetual blister on the back. This advice was not followed. She was directed to carry a book upon her head, and to use a pole which she was desired to place in various positions so as to exercise the upper extremities. Simple friction was also ordered, and reclining for an hour a day on the floor. This plan was followed for nine months without any apparent benefit. She returned to London in the summer of 1836, and from that time to October 1837, nothing was done with a view to remove the deformity but simply reclining about an hour daily. The deformity continued to increase, especially during a few months previous to my seeing her. Her health, also, was now fast declining.

Miss ——— became a patient in one of my private Orthopedic Establishments, and I ordered for her the use of my Patent Exercising Plane and Patent Spine Support, manipulations, nourishing diet, and exercise in the open air, with such medicines as the condition of her health appeared to require. This line of treatment was commenced on the 17th of October, 1837. Her health continued very delicate, but she gradually gained strength. I thought it prudent every now and then, in consequence of bodily indisposition, to diminish the exercise and to discontinue for a time the use of the Plane. The spine, however, was gradually brought up to its proper line, when the support was first applied, the curvature was so far diminished by its action, as to raise

her at once three-fourths of an inch in height, and in the course of a little time she was raised one inch and one-eighth, which brought the spine straight. The pain which she had so long experienced in the side was also removed. She continued in my Establishment for six months, and at the end of this time there was no appearance of the curvature, and scarcely any remains of the deformity of the ribs. Figure 18 represents the state of the back when she left the Establishment. There was then some fulness of the muscles of the back on the left side of the loins, which has been since almost altogether removed. It is now twelve months since she left my Establishment, during which she has been seen by me occasionally. She was directed to use the Plane in a modified degree, and also to wear the Support, which she continues to do, and she states that the Support is in every way easy and comfortable. Figures 19 and 20 represent Miss ——— as she appears dressed over the Support.

CASE 17.

PLATE X.—Figures 21 and 23 *Represent the Deformity.*

„ 22 and 24 *Show the improvement effected in Eight Months.*

Miss Allen, æt. 6, the daughter of a tradesman, a child of full habit, but of weakly constitution, was brought to me in June, 1838, for my opinion respecting the state of her spine, and the position of her head. Upon examination I found the spine curved and the head fixed in the positions seen in Figure 21 and Figure 23. The child's carriage was remarkably stiff and careful, and she was very apprehensive of any shake or sudden movement of the head, lest pain should be produced at its base, which she experienced when the head was not moved with great care and steadiness. I informed her mother who brought her to me, that I was of opinion that

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the spine might be straightened, and the head brought into its proper position, but that I was disposed to believe that there was diseased action going on at the top of the spine.

I found that in June 1837 she had an attack of fever, which, however, was not severe. She recovered from the fever, and in about three months she took cold, and at this time the head began to drop upon the shoulder. In the course of a month, measures were had recourse to for the removal of the deformity. Liniments were employed under the management of an eminent surgeon, without effect. An irruption on the skin was produced at the back of the neck by a topical application, and kept open for three weeks, but this was equally unavailing. The parents being anxious for the restoration of their child, and the more especially as she was the last they had living, had recourse to the most eminent physicians and surgeons in London, twelve of whom were consulted, and among them Dr. Blundell, Sir B. Brodie, Bart., Mr. Calloway, Sir Astley Cooper, Mr. Lawrence, &c. These gentlemen variously prescribed medicines, friction with liniments, topical irritants producing irruptions and sores upon the neck; fomentations, vapour-baths, warm-baths, sea air, setons down the back, and confinement in the horizontal posture. Of these modes of treatment, the two latter, however, were not tried. Notwithstanding the employment of these various remedies the curvature of the spine and wry neck continued to increase. The only benefit which the parents noticed from all that they had done for her, was some improvement in her health during her stay by the sea side.

The child was placed in one of my private Orthopedic Establishments, where she used my Patent Spine Support, with an appendage for the head; this appendage had the effect of keeping the head steady, and of maintaining it in the position in which it was placed. By the employment of these means I was enabled, in the course of eight months, to raise the head and reduce the curvature of the spine

to the degree represented in Figure 22 and Figure 24. After these drawings were taken, I had recourse to another little appendage, by the operation of which the head was brought to its natural perpendicular position upon the neck. I proceeded cautiously with my treatment, and in the course of a short time, the apprehension of pain from the movement of the head greatly subsided, but never left her altogether. She used my Patent Exercising Plane, to increase the strength of the muscular system, especially the muscles of the back and neck; and medicines were prescribed from time to time as the condition of her health required. Her health continued good with the exception of slight interruptions from cold and other trifling ailments, until about the end of January, 1839, when she had a severe cold, accompanied with considerable constitutional disturbance. She recovered from this slowly, but before her strength was perfectly restored, she was seized with vomiting and stoppage of the bowels, accompanied with gastric irritation, prostration of strength and great pain in the head. Medicines were had recourse to, to meet these symptoms, but with little benefit; her Support was removed, and she was kept in bed. The symptoms increased, and it was judged expedient that she should be taken to her mother's residence while it could be done with safety. I saw her in the evening after her return, in company with Mr. Young of Vauxhall. She continued much the same. The symptoms became very alarming the next morning, and in the course of two days no expectation was entertained that she would recover. She died on the fifth day after her removal from the Establishment.

The body was examined, and it was evident that the immediate cause of her death was water in the head.

Upon examining carefully the top of the spine, it was found that there had been diseased action going on between the first and second bones of the neck, and that the articulating surfaces of these two bones, where they naturally move freely one upon the other, had

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become consolidated by bone, so that no motion could take place between them. All diseased action in the bones had apparently subsided. The very limited rotatory motion of the head which she was able to produce took place mainly between the second and third vertebræ of the neck.

Remarks.

It is probable that, in this case, the wry neck arose from the disease which existed between the first and second bones of the neck, and which induced her to lean the head to the left side, where the diseased action was going on. The curvature of the spine was probably a consequence of this position of the head. The mode of treatment which I adopted was favourable, in some respects, to the arresting of the diseased action, by steadying the head upon the spinal column. The elongation of the ligamentous connexions, by which the second and third vertebræ are naturally bound together, was produced by the frequent attempts which she made to turn the head, after the first and second had become united by the interposition of osseous matter. Had she lived, it is likely that the spine and head would have been retained in their natural position, but the rotatory movements of the head upon the neck must have been always very limited.

CASE 18.

PLATE XI.—Figure 25, *Represents the degree of Deformity.*

,, 26, *The effect of Five Months' Treatment.*

Master ———, a delicate boy, æt. 12, was brought to me by his Father, from Beckley in Sussex, in consequence of a very bad curvature of the spine, and deformity of the chest.

The father states, that when his son was about three years old, the nurse fell down stairs with him in her arms. The parents were not aware that any injury was sustained by the child at the time, but within twelve months he began to grow crooked. He had always been a very

healthy child up to the time the deformity first appeared, his health not having suffered in any way from the fall.

The distortion got gradually worse, and when he was about five years of age, he was taken to an eminent orthopedic surgeon in London, who directed that he should be well nourished. He was ordered to lie on his back, which he did several hours a-day, and to practise gymnastic exercises daily. From this line of treatment the child became so weak and nervous, that he could scarcely bear to be spoken to, his health having suffered considerably. After a trial of nearly one year, without any apparent diminution of the deformity, the parents considered it prudent to discontinue this plan of treatment altogether, and not having confidence in any other plan commonly practised, nothing further was attempted until I saw him.

After the means recommended by the surgeon above alluded to were discontinued, he recovered his health rapidly; and though the deformity continued to increase, his health was not materially affected by it. Figure 25 represents the state of the back when I first saw him. This young gentleman was placed in one of my private Orthopedic Establishments, and I employed for his relief my Patent Exercising Plane and Patent Spine Support, with manipulations; I ordered for him nutritious diet, and directed him to take exercise in the open air. This course of treatment was commenced on the 27th of February, 1838. The application of the Patent Spine Support raised him at once one inch and a half, without pain or inconvenience; in the course of a week from the first application of the Support, he was raised two inches and a quarter; March 19th he had gained two inches and three quarters; on the 19th of April it was found that he had been raised three inches and a half. He now went into the country for a month, by his friends' desire, and remained in the country until the 19th of May. During the period of his absence I am not aware that he either gained or lost in height. From the 19th of May, when he

SECTION I.

returned to town, to the 24th of the same month, he was raised three-fourths of an inch, making together four inches and a quarter. On the 25th of July he had gained five inches and one-eighth ; he then left town again, and did not return until the 5th of September, when it was found that from some mismanagement of the Support, he had lost about half an inch: he, however, soon recovered this after his return, and gained by the 11th of October three-eighths of an inch more, making the increase altogether five inches and a half, which he had gained during the five months that he was under my care in London ; with of course, a proportionate diminution of the curvature. His appearance at the beginning of October, 1838, is represented in Figure 26. Circumstances happened in his father's family, which induced him to take the child from town. He left about the 11th of October, and I did not see him for above three months, when I found that through the yielding of the Support, which had become injured from wearing, he had lost more than half an inch. The Support was repaired and regulated for him, and then he returned to the country. At the beginning of April, 1839, he came to me again, and I found that his height was exactly the same as when he was last in town, and that he was half an inch shorter than he was on the 11th of October, 1838, when he left my Establishment.

Remarks.

This young gentleman did not suffer in his health from the use of the means employed. He had occasionally a little bilious headache, to which he had previously been subject ; but in other respects his health continued good, his strength also increased, and he experienced no bodily inconvenience worthy of notice from the use of the Support. He did not increase in height when he was absent from the Establishment, but on the contrary, lost half an inch in about six months. This diminution in his stature is to be attributed to the imperfect action of the Support, after it had become injured from use.

Mr. Brougham, surgeon, Falmouth, sent me the following letter respecting his son,—Case 19.

My Dear Sir, *Falmouth, 10th April*, 1839.

We feel highly gratified with your report of our dear boy's great improvement, and we feel confident that you will ultimately succeed in accomplishing a cure.

Annexed you will receive the history of Matthew's case.

Sometimes we were cheered with the hope that he was deriving benefit from the means employed, at other times much discomforted. In fact, the measures adopted appeared to retard for a time, the deforming process, but never to effect anything like progressive improvement.

After I had ascertained the deformity in Matthew's spine, I lost no time in consulting what I then supposed to be the best written authorities on the subject; viz., Dr. Dodd, Mr. Shaw, Mr. Beale, including the valuable remarks of Dr. Barlow, &c., &c. Dr. Bureaud Riofrey's remarks on 'Deviations of the Spine,' contained in letters addressed to Sir B. Brodie. I consulted with several of my medical friends here, and with some of the most eminent surgeons in London, who differed little in opinion from the routine of treatment that has been usually advised in such cases.

In the early part of last summer, my attention was directed to your published cases. I procured your work, and read it with great interest, and was strongly impressed with the opinion that the 'Patent Spine Support' appeared admirably calculated to accomplish the intentions held out, though I am willing to admit the previous knowledge of your celebrity in the treatment of fractures, &c., &c., made me feel the more sanguine in my expectations. The impression on my mind as to the probability of any benefit which he might be likely to receive from any plan of treatment then known, was unfavourable. I was of opinion

SECTION I.

that no permanent good would be effected by the ordinary mode of treating lateral curvature, from the conviction that a more efficient apparatus was required to support the spine than any with which I was acquainted, and unless it was supplied for my son within a given period, his case would become much more difficult to manage, and the prospect of accomplishing any important change in his figure would be materially lessened. It must be evident, at least in the more advanced cases of lateral curvature, that an instrument which would secure the advantages gained by the air or other measures, must be an object of paramount importance. As soon as I had obtained satisfactory information respecting your 'Patent Spine Support,' I considered that this deficiency was supplied. I had received strong impressions in favour of your system of treatment before I came to town, and these were fully confirmed the instant you allowed me the opportunity of witnessing its operation. I felt at once convinced that my son was likely to derive more benefit from the assistance of your plan of treatment, than from any other which I had seen or heard of.

Allow me to state that I am anxious that every publicity should be given to the extraordinary effect produced by your admirable system of treatment, in so far removing the deformity of my son's spine, and I feel it incumbent upon me to promote that object to the utmost of my power.

With sentiments of respect and esteem,

I remain, my dear Sir,

Your obliged and obedient Servant,

STEPHEN BROUGHAM.

Joseph Amesbury, Esq.

CASE 19.

PLATE XII.—Figure 27, *A Front View of the Deformed State.*
„ 28, *A Front View of the Improved State.*

SECTION I.

Matthew Brougham æt. 8, son of Mr. Brougham, surgeon, Falmouth, was born a strong, healthy boy, and continued to thrive well, until he was about two years and a quarter old. In January, 1833, he had an attack of spasmodic croup, accompanied with a crimson suffusion over various parts of the body. The croupy affection was entirely removed by an accidental scald over each arm. From the time of his first being able to walk, he was subject to falls. At three years of age he fell from a window-seat and struck his head severely; after this he suffered a good deal in the head. The functions of the digestive organs became deranged, especially the liver. He had a bronchial affection which continued for a considerable period, varying in its degree of severity from time to time. He was sent for change of air, and was much benefitted by it; but after some time his head became affected, and this was accompanied with much prostration of strength. The symptoms altogether led to the belief that he had an attack of influenza, which at that period greatly prevailed, and was in some instances accompanied with rheumatism, as in this case. He remained weak and lame for a considerable time, and was like a child learning to walk. He recovered slowly. In the course of 1835 he had two attacks of bronchitis, from the effects of which he gradually recovered. In 1836, it was discovered that some deviation in the spinal column had commenced. At this time the curvature was hardly visible when he was exercising himself, or when the spine was extended. *From this period every method was resorted to for the purpose of giving tone to the muscles, in accordance with the recommendation*

SECTION I.

of the most popular writers on the subject. The curvature, however, continued to increase: Mr. Brougham is strongly of opinion that the curvature of the spine originated primarily and principally from rigidity of the muscles of one side, consequent upon an attack of rheumatism.

In 1836 a respectable surgeon in London was consulted, who recommended the use of a prone couch, which was procured, but circumstances rendered its regular use impracticable. In 1837 Sir Astley Cooper, Bart., was consulted, who recommended a crutch support, to take off the superincumbent weight of the body, which proved inadequate for the purpose for which it was intended, and was consequently discontinued. While the child was under Sir Astley Cooper's care he had an attack of measles, which was followed by considerable debility of the muscular system, and an evident increase in the extent of the deformity. He was sent to the country, where his health was improved, but the deforming process was not arrested. For several months subsequent to the summer of 1837, little was done for the purpose of removing the distortion, and from what was attempted little benefit appeared to be produced. In July, 1838, his father brought him to London, and placed him under my care. The appearance of the front of the body of this child when he first came under my care, is represented in Figure 27, and the appearance of the back was very similar to that represented in Figure 33, Plate XV. The curvature, though only of two years standing, had passed into the second stage, and the ribs had become unnaturally bent and deformed. The right side of the chest projected considerably backward, and the deformity was rapidly passing into an irretrievable condition. His health was very delicate, the urinary organs irritable, the temper fretful, and his whole appearance indicated much organic distress.

Master Brougham has been in one of my Private Orthopedic Establisments for about nine months, and has used during this time my

Patent Exercising Plane, and Patent Spine Support; manipulations and other measures have also been employed, according to my plan of treatment, as the circumstances of his case required. He was raised, insensibly to himself above one inch by the operation of the Support, when it was first applied; and in the course of a short time after, it was found that he had gained in height, from the reduction of the curvature, three inches and a half. Upon the whole, his health has been good, it having been interrupted only now and then by trifling ailments. He was soon relieved of the irritability of the urinary organs; the fretfulness of his temper also subsided, he soon became cheerful, and he is now a studious and clever boy.

Figure 28 shows the degree of improvement which has been effected in his figure since he came under my care. There still remains to be removed a slight curvature of the spine, and some deformity of the ribs.

CASE 20.

Plate XIII.—Figure 29, *Represents the Figure of the Back when I first saw the Case.*

„ 30, *Shows the difference produced by Treatment in the course of Nine Months.*

Miss ———, æt. sixteen, a small made child, and of short stature, was brought to me by her mother, with a double curvature of the spine, which was first noticed when she was about seven years old. The spine had become strongly fixed in its unnatural line. The principal curve occupied the upper part of the column, producing on the right side a large projection of the ribs which were much deformed; on the left side the ribs were carried in upon the heart, and were much thrown forward and deformed. Her health was good, and had not been particularly impaired before the commencement of the curvature. About a month before I saw her, pain had commenced in the side, and was increased by walking. Her bodily condition had already

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begun to produce much uneasiness of mind, and though her disposition was naturally very lively, she was sometimes, in secret, much depressed.

She had recourse to the use of a reclining board, with a hole in the upper end for the head. This was used for a short time daily. She swang by the arms, suspending herself by means of a rope, but this distressed her, and it was discontinued. No confidence was felt in the treatment adopted, and it was, therefore, not regularly followed; nothing more than what I have stated was done for her until she came to me.

She was placed in one of my Private Orthopedic Establishments, and was ordered a Patent Exercising Plane, and Patent Spine Support, with manipulations of the affected parts, nourishing diet, and free exercise in the open air. In the course of *twelve days* she had gained in height by the reduction of the curvature, under the operation of this plan of treatment, nearly one inch and a half; and in three months from the commencement of the treatment, she had gained two inches and three-quarters. The appearance of her figure was now greatly improved; there yet remained a considerable curvature, which was very firm, and the configuration of the chest, though greatly altered for the better, was still far from natural. The deformity of the ribs resisted the means employed, and I had recourse to additional means suited to the case, for the purpose of forwarding still more powerfully the restorative process; but in the course of nine months, with all our endeavours we were not able to gain more in the accomplishment of our object, than is represented in Figure 30.

Soon after her admission into my Orthopedic Establishment, her mind became tranquil, and her spirits were remarkably buoyant and lively. The pain which she experienced in her side was removed; her health continued good, and the strength of the muscular system was greatly increased.—Recommended to continue in the use of the same means.

CASE 21.

PLATE XIV.—Figure 31, *Shows the degree of Advancement which the Curvature had made.*

„ 32, *Shows the degree of Reduction produced by Treatment in Eleven Months.*

Miss ———, æt. sixteen, a tall thin girl, was brought to me from the country, with a curvature in the spine, as represented in Figure 31. The deviation was first noticed when she had attained her tenth year. She was at this time growing fast, and the deformity was attributed to this circumstance. She was quite healthy when the curvature commenced, but her constitution was not strong. She was at school, where she was kept sitting on a form for five or six hours a-day. This was continued until within about three months before I saw her. During the latter period she was allowed a seat with a back to it. When she came to me she was weak; and had been for some time subject to a cough, which was slight during the summer months, but was very troublesome in the winter. She was placed under medical care in consequence of this, and obtained some relief, but the cough was not removed. She suffered a good deal from indigestion and confined bowels; also from pain in the side, and weakness in the back, which were increased by walking any considerable distance. The knowledge of the condition of her spine, and the belief that nothing could be done to remove her sufferings, operated latterly much upon her spirits. She became so much depressed that she frequently separated herself from the society of her friends, and took a book to some lonely part of the house, where she sometimes remained in seclusion for hours together. She was glad to be in any place where she could avoid the observation of others. Upon examining the back, I found a large double curvature, occupying the whole line of the spinal column, the largest portion of which

SECTION I.

was formed by the dorsal vertebræ. There was torsion of the spine producing a considerable projection of the right side of the chest backward, and a corresponding projection of the left side of the chest forward.

When Miss ——— was placed under my care, I ordered for her my Patent Exercising Plane, and Patent Spine Support, and manipulated the deformed parts as in other cases. She was so weak at this time, that she was unable to use the Plane without considerable assistance from the box, and then only in a very slight degree. The Patent Spine Support was applied, and she was immediately raised by it one inch; in about seven weeks she was raised one inch and a half; in five months she had gained two inches and a quarter. The remainder of the curves yielded very slowly, so that in the course of eleven months we had only brought the back into the condition seen in Figure 32, though additional measures were had recourse to, modified so as to meet the circumstances of the case. Under this course of treatment her spirits revived, her strength increased, her cough and the pain in the side left her, and she can, at this time, walk several miles without fatigue. She is cheerful and looks well; her figure is greatly altered for the better; there yet remains, however, a double curve in the spine, though comparatively very slight, and some deformity of the chest.—Recommended to remain in the Establishment, and continue the same means.

CASE 22.

PLATE XV.—Figure 33, *Shows the State of the Back before the Application of the Author's Patent Spine Support.*

„ 34, *Shows the State of the Chest after the patient had been under Treatment with the Support about Fifteen months.*

Miss ———, aged seven years, the daughter of a respectable tradesman, was brought to me in November, 1836, labouring under great

distortion of the chest and spine, and a twist forward of the left portion of the lower part of the back, see Figure 33. Her father stated to me, that the deforming process commenced when she was about fifteen months old, without any evident cause, further than might be attributed to the state of her health, which was at that time very indifferent. The deformity commenced in the middle of the back, and gradually increased till the whole of the spinal column became involved in the curvature. Her health continued ailing and her mind fretful up to the time of my seeing her. At this period the belly protruded considerably, and her general aspect was unhealthy. She had used one of the most approved Spine Supports for about four years, during which she suffered much inconvenience from the pressure, but without any apparent diminution of the curvature.

I had recourse in the first instance to such measures as I was in the habit of using, for the purpose of bringing the bones into their natural position, and of increasing the strength of the muscles, especially those of the spine. Pressure carefully applied, well-regulated exercises, and a generous diet, were the means employed to effect these purposes. These means were continued till the 5th of April, 1837, with great advantage to the child, in health, strength, and form. At this time her father and I took her height, and then I applied my Patent Spine Support, and immediately afterward we measured her again, and we now found that she stood *one inch and three quarters taller* than she did immediately before the application of the Patent Spine Support. Her general form also was greatly altered for the better; the protrusion of the belly was almost removed, and the curvature of the spine greatly diminished. I now directed that she might sleep in the Patent Spine Support, and continue the other measures nearly as before; relaxing somewhat in her exercises, in consequence of the sense of confinement which she was likely to experience for the first few days. Next morning I found her rest had been as

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usual—sweet and free from disturbance. The use of the Patent Spine Support and other means were continued. In the course of two or three days, I had occasion to take off the Support, and leave her without it for a few hours, in consequence of some trifling alteration which it required; she expressed herself as being very uncomfortable without it, and desired to have it re-applied. She was soon able to go on with her exercises with freedom, in the same manner as before the application of the Patent Spine Support. At the expiration of six weeks she was again measured, and it was found that she stood *three inches and a quarter taller than she did immediately before the application of the Support.* Having occasion to take off the Support, I was desirous of observing how far she was able to sustain herself without it, and I found she stood *upwards of two inches and a half taller than she did just before it was applied.* Her form was also remarkably improved. The circumference of the chest over the protuberances occasioned by the curvature had diminished about three inches, and the protrusion of the belly was wholly gone.

The progress of reduction of the curvature, and, consequently, of increase in her height, went on gradually, as marked by the following ascending scales, which show the increase in her stature that took place from the 5th of April, 1837, when the author's Spine Support was first applied, up to the 25th of September, 1838. It should be remarked that she was out of town ten weeks in the course of this period, and that during this time it was ascertained that she gained nothing in stature.

The middle line shows the extent of the increase in her height in the time above mentioned. The scale on the right side shows the degrees of increase marked at the time of measurement at different periods, between the 5th of April, 1837, and the 25th of September, 1838, as she stood in the Support. The scale on the left hand side of the page shows her increase in height according to the measures, taken from time to time, as she stood without support of any kind:—

As she stood when the Patent Spine Support was removed.	*As she stood wearing the Patent Spine Support.*
Jan. 2nd, 1839, $6\frac{3}{4}$ inches taller.	raised $6\frac{3}{4}$ inches, Sept. 25th.
	raised 6 inches, Aug. 18th, 1838.
	raised $5\frac{1}{4}$ inches, Dec. 12th, 1837.
Nov. 4th, „ $4\frac{3}{4}$ inches taller.	raised $4\frac{3}{4}$ inches, Nov. 3rd, „
Oct. 4th, „ $4\frac{1}{2}$ inches taller.	raised $4\frac{1}{2}$ inches, Oct. 13th, „
	raised 4 inches, Sept. 28th, „
	raised $3\frac{1}{2}$ inches, July 29th, „
July 29th, „ $3\frac{1}{4}$ inches taller.	raised $3\frac{1}{8}$ inches, May 4th, „
May 4th, 1837, $2\frac{1}{2}$ inches taller.	raised $2\frac{1}{2}$ inches, April 16th, „
	raised $2\frac{1}{4}$ inches, April 12th, „
	raised $1\frac{3}{4}$ inches, April 5th, „

By the first application of the Patent Spine Support she was—

April 5th, 1837, Height without Support, $38\frac{1}{4}$ Inches.

There still remains in this child some curvature of the spine, which is very firm and unyielding; there is also some projection of the left side of the chest backwards. Fig. 34 shows the appearance of the

SECTION I.

chest and front of the body, as it was taken after she had worn the Patent Spine Support about fifteen months.

Her health, which, previous to my seeing her, was always ailing, gradually improved under the treatment adopted, and has been for a considerable period very good. The fretfulness which she had manifested before I saw her has now subsided; and her mind has become more easy and tranquil. She still continues the use of the Patent Exercising Plane and Patent Spine Support. She has increased in height not more than one-fourth of an inch for the last six months, which remarkably illustrates the fact, that the rapid increase in her stature is to be attributed almost altogether to the reduction of the curvature of the spine, and not to the growth of the body.

CASES FURTHER ILLUSTRATIVE OF THE PROGRESS OF LATERAL CURVATURE, AND OF THE BENEFICIAL EFFECTS OF THE AUTHOR'S TREATMENT.

CASE 23.

PLATE XVI.—Figure 35. *The Deformed Appearance of the Back in Case* 23.

Miss ———, æt. twenty-two, came from the country with her father to consult me respecting the state of her spine and chest. This lady was labouring under the deformity represented in Fig. 35. She was tall and thin, and, with the exception of the curvature of the spine, she was well made. The deformity was first noticed when she was about fourteen years of age. It could not be traced to any evident cause, and, as it did not affect her health, but little was done for the restoration of the spine. She felt weak in the back, but she was in other respects quite well.

I found the curvature had passed into the second stage, and that the ribs had become deformed. There was a considerable projection of the right side of the chest, backward, and to the right. The ribs ad-

vanced forward on the left side, leaving a concavity in the back part of the left side of the chest.

This lady was placed in one of my Private Orthopedic Establishments, where she continued under my care about five months, during which she was submitted to the influence of my Patent Spine Support, and Patent Exercising Plane, and daily manipulations of the deformed parts.

She soon began to improve in strength, and the curvature yielded readily under the operation of the means employed. At the end of five months she stood upwards of one inch taller than on her admission, in consequence of the reduction of the curves, which were now nearly removed. The deformity of the chest was also diminished in a corresponding degree, and her figure was greatly altered for the better. Family circumstances, however, required her absence for a time; but should she return to town, I have no reason to doubt that the remains of the curvature and of the deformity of the chest would be removed by persevering in the same line of treatment.

CASE 24.

PLATE XVI.—Figure 36. *The Deformed Appearance of the Back in Case* 24.

Miss ———, æt. nineteen. I was applied to respecting this young lady in consequence of a double curve which she had in the spine, and which had existed upwards of six years. She is a person of rather full but relaxed habit; she suffered occasionally from weakness of the stomach; in other respects her health was good.

Soon after the deviation of the spine was discovered she was sent to Paris, and was there placed under treatment for her restoration. She reclined for some hours daily, and used strengthening medicines. These means were continued for six months in Paris, and for some time after her return, but without any diminution of the curvature. When she was

SECTION I

about fifteen years of age, she was placed under the care of a respectable surgeon in London. This gentleman recommended confinement upon the back, and frictions over the affected parts. This plan of treatment was followed for one year with some advantage, but this was of short duration. During the three years previous to my seeing her but little was done, with a view to remove the curvature, besides rubbing the back. She was ordered to carry a weight of six pounds upon the head. This advice, however, was not much followed.

Upon examining the back, I found the curvature had passed into the second stage, and that the chest had become much deformed. There was a cast of the back taken when she was thirteen years of age; and by comparing the back with this cast, it was evident that, notwithstanding the use of the means which had been employed, there was a considerable increase in the degree of deformity of the spine and chest. The modes of treatment had recourse to, probably retarded, but did not prevent the progress of the deforming process.

I recommended the use of my Patent Exercising Plane and Patent Spine Support, with manipulations of the deformed parts. I carefully measured the height of the body at the time this treatment was commenced, and again as soon as the Patent Spine Support was applied, and I found that she had gained in height, by the application of the Support, one inch and a half. The treatment was continued, and in about six months she measured two inches and a half taller than when I first saw her. The curvature was greatly diminished, and the deformity of the chest had now become slight. Her whole figure was greatly improved by the reduction of the curvature, and by the alteration in the form of the chest; she was much stronger in body, and her health continued good. Her height at this time, without the Support, was much the same as when she stood in it; when the Support was removed, she sunk only about one-eighth of an inch. She is still continuing the use of the same means.

CASE 25.

A lady, æt. sixteen, was brought to me labouring under a double curvature of the spine, which comemnced about four years before I saw her. The curvature was similar in its character to that represented in Figure 36,* but the curves were not quite so deep. This lady is of a robust constitution, and of rather a full habit. She suffered only from the deformity of the spine, which was accompanied with much weakness in the back. She was taken to Paris, and, after consulting the chief authority there in the management of spinal cases, her friends determined to bring her to London. She was placed under the care of an eminent surgeon in London, who ordered for her a support, which was made to rest upon the hips, and come up with small crutches under the arms. She wore this crutch-support for a year with much suffering, and without any apparent reduction of the curvature. She also practised the gymnastic exercises, under this gentleman's direction, during about three months of this time, without any sensible advantage.

This lady has been under my care, in one of my Private Orthopedic Establishments about five months, using my Patent Exercising Plane and Patent Spine Support, and has had the deformed parts manipulated according to the condition of the curves, as in other cases. The distortion of the spine has yielded to these means, and is now about three-fourths reduced. She has been raised by the reduction of the curves which has taken place about one inch and a half, one inch of which was gained during the first month. Her chest approaches to the natural form as the curvature gives way. Her health is very good, and she is much stronger than when she was first submitted to my plan of treatment. She is still under my care, continuing the use of the same means.

* There is no Figure to this case: the Figure most resembling her back is referred to.

Section I.

CASE 26.

Plate XVII.—Figure 37, *Represents the form of the Back in Case 26, as it appeared when the Lady came under the Author's care.*

Miss ———, æt. twenty-five, became a patient in one of my Private Orthopedic Establishments, in consequence of a double curvature of the spine, which was first noticed during childhood. The upper curve presented to the right, and was much fixed. The chest was considerably deformed, the ribs having become unnaturally convex on the right side, and unnaturally flattened on the left. The general appearance of the back, when she came under my care, is represented in Figure 37.

The treatment first adopted for the relief of this lady was confinement in the horizontal posture, which she maintained for one year without rising for any purpose. The effect of this treatment was wasting of the lower limbs, and great bodily weakness. This plan produced a favourable difference in the line of the vertebral column; the advantage, however, which had been gained during the twelve months' confinement was soon lost after she began to rise, though she was permitted to sit up only a short time daily. Sometime after this she was sent to Hinchley, and was placed under the care of the late Mr. Cheshire, from whose attention and management she received some relief. The lower curve, it was thought, was diminished by the use of the means which he employed; and she found that she could not sit up long together without the use of his apparatus. Her health was very delicate and her constitution weak, but her disposition was lively and unusually amiable.

I recommended the use of my Patent Exercising Plane and Patent Spine Support, with manipulations of the deformed parts. I also

ordered for her such medicines as the state of her health required. She soon began to improve, under this line of treatment, in health and strength. She has been persevering with these means about eight months, and during this time the curvature has been gradually yielding, the projection on the right side is greatly diminished, and the figure is consequently much altered for the better. The weakness which she experienced in the neck and back has subsided, so that she does not feel it while she is wearing my Support. Her whole progress in health and strength, and in the improvement of the condition of the spine and chest, though not rapid, is very satisfactory.

CASE 27.

PLATE XVII.—Figure 38, *Shows the degree of Deformity in Case 27, as it was before the Author's Treatment was Commenced.*

Miss ———, æt. eighteen. I was consulted respecting this young lady, in whom a double curvature of the spine had taken place, which was first noticed when she was about ten years old. Her mother was rather disposed to attribute the origin of the curvature to a habit of standing on one leg, and to awkwardness in the manner of holding herself when writing or dancing.* The curvature has made progress in proportion to her growth for the last six years, which is manifest from her not being any taller than she was two years after its commencement. She bore, and recovered from the complaints to which children are especially subject, unusually well, and the usual state of her health has been very good. When she came to me, her countenance presented the appearance, of a robust healthy girl. The curvature was double,

* I would remark, that what is here considered to be the cause is sometimes the result of muscular weakness, and is to be noticed as a warning to those who are intrusted with the management of children.—AUTHOR.

SECTION I.

as seen in Figure 38. The right side of the chest projected considerably backward and to the right, and the ribs were much deformed; the left side advanced forward, and was flattened at the back part, the ribs having lost their natural curve. The upper curve of the spine was very firm.

The parents of this young lady had received but little encouragement from their medical advisers to have recourse to any of the usual modes of treatment, and consequently little was done for her relief, and that which was done did not appear to be of any benefit.

This young lady was placed under my care in September, 1838, and was subjected to my usual mode of management, with my Patent Exercising Plane, and Patent Spine Support, and manipulations of the deformed parts. She has gradually improved in strength under this treatment, and the deformity of the spine has gradually given way. She has been raised upwards of an inch and the projection of the left side has correspondingly diminished. The curve at the upper part is very strong, but it continues to yield slowly under the use of the means employed. Her health continues very good. She has been under my care seven months, and she now stands about the same height, when the support is removed, as when she is wearing it. She has not suffered any discomfort worthy of notice during the treatment, which she is willing to continue as long as may be necessary.

CASE 28.

PLATE XVIII.—Figure 39, *The Appearance of the Back in Case* 28, *as it was when I first saw it.*

A lady, æt. twenty-one, was brought to me, having the curvature in the spine which is represented in Figure 39. This lady's constitution is naturally delicate, and she has suffered much during the last three years from indigestion and headache. The curvature was first noticed

when she was about thirteen years of age. At fourteen she was recommended to try the effects of the reclining posture, which was adopted and followed almost constantly for one year, during which period she continued to get worse. She was then advised to dress without stays, and to have recourse to gymnastic exercises. This advice was followed, and the exercises were continued for a considerable period; not only without any perceptible benefit, but, on the contrary, the curvature continued to increase. Friction was then tried, without profit, shampooing also, with no better success. She was now ordered a support for the spine, which was made to rest upon the hips, and to extend to the arm-pits, in the form of small crutches. This crutch-support she wore for seven months with much pain, and without any perceptible advantage, the curvature continuing to increase.

After trying so many modes of treatment for the relief of this young lady, not only without any improvement in the state of the spine and chest, but with manifest increase in the depth of the curvature and in the deformity of the chest, her mother was ready to give up the case in despair, when a friend of the family called upon me respecting her; and, being encouraged by my report, the lady was placed under my care in one of my Private Orthopedic Establishments.

I recommended the use of my Patent Exercising Plane and Patent Spine Support, with manipulations, and such medicines as the state of her health required. She has been following this plan of treatment six months, and now the curvature is about three-fourths reduced, and she is about one inch and a half taller than when she was admitted into the Establishment. The deformity of the chest is greatly diminished; her health is also much improved, and her strength is gradually increasing. Her spirits were depressed, and she was disposed to be petulant; but she has now become cheerful and happy, prosecuting carefully the use of the means which I first recommended, except the medical treatment, of which she no longer stands in need.

CASE 29.

Plate XVIII.—Figure 40, *The Appearance of the Back in Case 29, before the Author's Treatment was Commenced.*

Miss ———, æt. nineteen.—This lady had a double lateral curvature of the spine, accompanied with great deformity of the chest, as seen in Figure 40. The curves were very firm, especially the upper one, which was formed principally by that portion of the spinal column to which the ribs are attached. The spine was spirally twisted so that the ribs on the right side were carried very much backward and to the right, and were much deformed; and those forming the left side of the chest were carried forward; and the back of the chest on this side was flattened from the deformity of the ribs which had taken place. The lower curve turned to the left, and was formed by the lumbar vertebræ. Both curves had acquired firmness, and the spine was strongly maintained in its deformed position: the upper curve, however, was the most unyielding.

Upon inquiring into the history of this lady's case, I found that the deformity was first noticed when she was about thirteen years old. Soon after its commencement, she was laid down and kept upon her back for three years. During this time her health gradually declined. No benefit was derived from this plan; but, on the contrary, her health was greatly injured, and the deformity of the spine grew much worse. She became so weak as to be unable to sit up. She was now advised by an eminent surgeon in London, to leave her couch, and wear a support made to rest upon the hips, and to come up under the arms with small crutches. She wore this crutch-support about three years, without any profit beyond the aid which it afforded her in sitting up; she had, however, discontinued it a few months before I saw her. I recommended for the relief of this lady the same

treatment as in the former cases, modifying it only according to the circumstances of her case. My Patent Spine Support was applied, and she was raised immediately by its operation three quarters of an inch; four days after I found she had been raised one inch, and at the expiration of three weeks she stood one inch and a quarter taller than before I was consulted. Her bodily strength was also increased.

Some time afterwards this lady's health began to decline; she suffered from indigestion, loss of appetite, and bodily weakness; I consequently advised her to go into the country for change of air. It was supposed by her friends that her indisposition was in some way connected with the operation of the means employed for the restoration of her spine and chest; and under this impression they were induced, after they left town, to discontinue the use of the Support—whether wisely or not, I shall not take upon myself to determine.

Remarks.

I cannot say that the health would not have become disordered in this case had the treatment never been commenced; but, if otherwise, such effects produced by it must be regarded as the exception, and not the rule. It is very evident that the influence of my treatment upon the body, in the great majority of cases of spinal curvature, is most powerfully strengthening and curative.

CASE 30.

PLATE XIX. Figure 41, *shows the degree of progress which the Deformity had made in Case* 30.

Miss ———, æt. twenty, came to me with a very bad double curvature of the back, as represented in Figure 41. The principal curve is high up, and very firm. The ribs are much deformed, and the chest much contracted; her pulse is hurried, breathing quick, temperament very nervous, her appetite bad, and she feels very weak;

SECTION I.

she is free from cough and pain in the chest. The curvature was first noticed when she was about fourteen years old, in consequence of the projection of the right shoulder. This occurred when she was at school, and it was considered to have originated from holding herself in a bad position when writing. She was taken from school, and her parents were recommended by their medical attendant to place her to do a portion of common house-work daily. This was done for about three months without any profit. The curvature increased rapidly, and the deformity of the chest progressed in a corresponding degree. The back had acquired, in the course of six years, the appearance represented in the Figure.

I reported to the mother that her daughter's case had proceeded so far that she must not expect a restoration of the spine. I stated that the condition of her health would not allow of the active employment of the means which I use in the treatment of spinal curvature, that she would be benefited, that her progress would be very slow, and that the degree of advantage which she would gain would be, from the nature of her case, very uncertain. Her mother was very desirous that I should take her daughter under my care, for at least a short time, in order to try the effect of my plan of treatment. Miss ——— herself was also very anxious that I should not send her away without a trial.

I had recourse to my usual mode of treatment, and proceeded very cautiously in my management. She gained strength by using my Patent Exercising Plane. The curve in the back gave way slowly, and the figure assumed a more natural appearance. She continued under my care about eight months. She was exceedingly nervous when she came to me, so that circumstances which would have been but little felt by others made a very great impression upon her. When there was the least intimation given by her friends that it was their wish that she should shortly return into the country, she was much affected by it, and was unable to proceed with her usual exercises for several days.

At the end of eight months, when she was in high spirits from the progress which she was making, she received a letter stating that it was expected her father would send for her in the course of two months. In consequence of this intelligence, as it appeared, she became so alarmingly ill, that I thought it right to advise her father to send for her without delay; recommending, him to be exceedingly careful in all his communications with her. She returned home and shortly after died.

Remarks.

Young persons afflicted with spinal curvature, and who have arrived at the age of maturity in this state, frequently, as I have said, become desponding, and often very irritable; and occasionally, as in this case, sensitive to an extreme degree. Parents, therefore, should be extremely cautious in their intercourse with their children labouring under this malady, lest they should unintentionally distress their minds, and produce such consequences as they might never after be able to remove. Had the information which was sent to Miss ——— been accompanied with a promise that she should return again to my establishment, according to her father's intention, I have no doubt that she would have received it with pleasure; but, having been communicated incautiously and unthinkingly, the effect was speedily manifest and very distressing to all who were interested in her welfare.

CASE 31.

PLATE XIX.—Figure 42. *Represents the Deformity of the Back in Case* 31.

Mary Anne Monro, æt. 59. The curvature in this poor woman's case is formed by all the vertebræ of the back, and is a good example of this variety of curvature. She states that the back was of its natural form when she was about fourteen years of age. At this time she was employed in frame-work, and to this she attributes the commencement of the distortion of the spine. There was, however, a rickety con-

SECTION I.

dition of the system manifested in her youth, and which showed itself in the leg and thigh bones, which are still bent out of their proper line. The chest is not so much contracted as in many cases; and consequently she has suffered less in health than might have been expected from the extent of the curvature. She is remarkably stunted in body, her height being not more than four feet five inches.

Remarks. I have inserted this poor woman's case merely to show the character of the distortion of the spine, the curvature being of that description which is far less common than the other varieties which have fallen under my observation. She was not disposed to have anything done for the relief of her spine and chest, consequently nothing was attempted.

CASE 32.

PLATE XXV.—Figure 53.

I shall give the history of this case nearly in the gentleman's own words. When he came to me he was about twenty-two years of age.

He says, "When I had attained the age of fourteen my friends observed that my right shoulder began to project beyond its natural position, which was imputed by them to a fall that I had then lately received by being accidentally thrown out of a gig. Previous to this accident there was no appearance of deformity. The projection in a short time was much enlarged, and my left side became very painful; I was therefore obliged to procure medical advice. For some time the pain in my side was diminished, and I appeared to gain strength, but I was still prevented by it from remaining long in the standing or sitting posture, and from walking much, or engaging myself in any athletic exercises. The deformity continued to get worse, and at length my side became so very painful that I determined to place myself under Mr. Amesbury's care, to whom I had been recommended."

I advised this gentleman to use my Patent Spine Support and

Patent Exercising Plane, and I manipulated the affected parts. These means were adopted and continued for about six months. The result of this treatment he states as follows:—

"I have received very great benefit from Mr. Amesbury's surgical care and kind attention. The pain in my side has been wholly removed by his treatment, and my deformity is much diminished. In the course of six months I was raised in height by the means employed nearly two inches, and the protuberances in my chest were reduced nearly four inches and a half. The form of my body is much improved, and my general health is much better. I still wear Mr. Amesbury's Patent Spine Support, by which my body is effectually supported, and from which I continue to derive much comfort."

CASE 33.

PLATE XX.—Figures 43 and 44, *Show the extent of Deformity which existed in this Case when I was first consulted.*

Miss ———, æt. eighteen. In this young lady the curvature commenced when she was between ten and eleven years old, prior to which she was remarkably upright and tall but delicate, having suffered much from fever, measles, &c. Miss ——— was the daughter of a respectable medical practitioner, who had recourse to friction and the occasional use of a reclining board, attending at the same time to her general health. This treatment was fully approved of by one of our most eminent surgeons, who was of opinion that nothing further could be done. The curvature continued to increase rapidly; and when she was brought to me the appearance of the back was the same as is represented in Figures 43 and 44. The distortion was very great, and the chest terribly deformed and contracted; the ribs on the right side were thrown back by the torsion of the spinal column, which was so turned by the rotatory or spiral movement of the parts, that a portion of the spine, which naturally presents anteriorly, was turned round so as

SECTION I.

to present towards the right side of the body; and the ribs, after being carried back by the torsion of the spine, were again bent upon themselves, forming a narrow and very prominent projection. They were then, as they advanced forward, brought nearly into contact with the anterior parts of the bodies of the vertebræ, which were turned round, as I have said, towards the side. By this arrangement of the bones the right side of the chest was greatly contracted, and the lungs on this side had consequently little room to move. See Figure 44. On the left side the ribs were thrown forward, and were deprived of their natural convexity, having become elongated and flattened, and driven in upon the heart and lungs, and consequently producing much contraction of the left cavity of the chest. See Figure 43. The heart and lungs were much impeded in their movements by the mechanical obstruction of the ribs, and there was consequently much distress experienced in breathing, and frequently distressing palpitations of the heart. The appearance of the body, when the back and part of the right side were brought into view, is seen in Figure 44. The appearance when the back and part of the left side were viewed is represented in Figure 43.

I stated to her father that I was of opinion that Miss ——— might be somewhat benefited, but I was apprehensive that the deforming process had proceeded so far, and her health was consequently so indifferent, that I did not expect any great alteration would be produced in her condition.

I commenced the treatment of this case very cautiously, and proceeded as I found her health and strength would allow. For some time she appeared to gain strength, and the curvature of the spine gave way so far as to produce an increase in her height to the extent of one inch. I continued the treatment with much circumspection, prescribing for her such medicines as the state of her health required from time to time. In the course of the treatment, however, she had an attack resembling

influenza, which much shook her constitution and greatly added to her weakness. After this I was scarcely able to do anything for her in respect to the spine. I saw that nothing more could be done for her in town. The only thing that seemed likely to help her was a change of air; but it was very doubtful whether, under any circumstances, in her state of deformity, the system would again rally from the shock which this attack had occasioned. She returned home as soon as the weather and the state of her strength would permit. She bore her journey home very well, but died very shortly after her arrival.

Remarks.

The case of Mr. Brougham's son, and the case which I have just reported, illustrate strikingly the insufficiency of the usual modes of treatment. Had there been any mode known by which such frightful deformity might have been prevented, no doubt the fathers of these two children would have had recourse to it soon after the commencement of the deforming process. They trusted not to their own judgment merely, but had recourse to eminent professional advisers; and, of the means which have been commonly employed, they adopted for the benefit of their children those which they considered to be the best. The deforming process, however, made rapid progress in opposition to all their efforts, till, in Miss ———'s case, it had produced a degree of mischief which no man could remove; and in Master Brougham's case it was rapidly bringing the child into a condition equally irremediable.

Of the Benefit produced by the Author's Spine Support when used without the Exercising Plane.

In some cases of curvature it is not advisable, from age or other circumstances, that the afflicted persons should submit to the treatment above recommended for the restoration of the spine. In order to give relief to such persons, I have recourse to my Patent Spine Support, with such additional aid as the condition of the spine and chest may indicate.

SECTION I.

The Support prevents the curvature from increasing, and produces a favourable impression upon the deformed parts. It in a measure improves the figure, and also diminishes the bodily pain which is sometimes felt in such cases. It has likewise a beneficial effect upon the state of the health, which is often much deranged in consequence of the existence of the curvature. The advantages of the Support used in this way are illustrated by many cases, some of which I shall now proceed to mention.

CASE 34.

Lady ——— applied to me in consequence of a very bad lateral curvature under which she laboured, and which had occasioned her much bodily suffering. It commenced after her marriage, when she was about twenty-three years of age, and continued to progress, increasing rapidly after the birth of every child, until at length the distortion nearly resembled, in extent and appearance, that represented in Plate XXI.

This lady had been using for many years one of the most approved crutch-supports, from which she derived some relief. I advised her to try the effects of my Patent Spine Support, and one was accordingly prepared for her.* After the Support had been adjusted, and she had worn it a few days, I received a note from her containing the following paragraph:—

"My present Support is now perfectly easy, and during five or six days of great exertion and fatigue I have found it a wonderful comfort

* I had an opportunity in this case of observing the comparative difference in the supporting power of the crutch-support in common use, and the Spine Support which I have introduced. I measured her Ladyship as she stood without artificial aid of any kind; I then measured her as she stood in the crutch-support which she had been wearing, and I found she was raised by it one-eighth of an inch. The crutch-support was then removed, and my Patent Spine Support was applied; I then measured her again, and found she was raised by it three quarters of an inch.

and cause of unfeigned thankfulness to Him from whom *all* good proceeds." SECTION I.

This lady had occasion to go abroad very shortly after my Support was applied; and at the end of ten weeks she favoured me with a letter, in which she states that she had contrived an additional prop for her side, which, in connexion with my Spine Support, she found more advantageous than my Support alone. She kindly enters into the difficulties of her case, which led to the adoption of this prop, the nature of which she describes, hoping that I might be able to make it useful to others under similar circumstances. Since this communication was received, I have, in one case of a very aggravated nature, applied a modified prop to the side, upon the principle suggested to me by her Ladyship, and found it of considerable advantage to my patient. See Case 36.

CASE 35.

Miss ———, æt. forty. This lady had a double lateral curvature, which commenced when she was about twelve years of age. She felt pain and weakness in the back, which continued about twelve years after the deviation was first observed. During this period the curvature increased very slowly. At the end of this time she was confined upon her back for one year, and when she got up the spine was apparently straight. After this she felt little inconvenience in the back until a short period before I was consulted, and that which she experienced was increased, she thought, by a fall. The state of her health was always very delicate, and frequently disordered. She became very sensitive and nervous. Her digestion was delicate, and her rest indifferent. She was subject to palpitation of the heart to a great degree, so much so as to lead to the belief that this organ was diseased. Upon examining the back, I found a double lateral curvature, which had not passed into the second stage.

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I recommended this lady to use my Patent Spine Support, for the purpose of upholding the spine and preventing the curvature getting worse.

She has now worn the Support one year, with much advantage. She is sustained in a comfortable position; her digestion is good; her rest is much more tranquil; the palpitation of the heart has nearly subsided, occurring only slightly after extraordinary exertion. Her general health is in every respect much improved.

CASE 36.

Mrs. ———, æt. thirty. The curvature in this ladys spine is very great. The convex portion of the curve projects greatly to the right, and the left hip projects in the opposite direction in a corresponding degree. The left side of the chest is thrown in upon the heart and lungs, and the left shoulder is much depressed. The nervous system is very irritable, and her health is frequently disordered. For about a year before I saw her she had been unable to walk, with any comfort, even about the house; and during this time she had been wholly deprived of the advantage of walking out of doors, in consequence of bodily weakness and nervous irritability.

The curvature commenced when she was about twelve years of age; but it was not until she had attained her fourteenth year that anything was attempted for her relief. During this period the curvature made progress and the health became disturbed. She was always a delicate girl; and, from the age of thirteen to fourteen, she grew very fast, but did not increase in height, the growth of the trunk in length having served merely to augment the extent and depth of the curvature.

At this time she was advised by the medical attendent to take freely of nourishing diet, and to use a reclining board. The deforming process went on slowly until she attained the age of twenty-one, when

she had an attack of fever, by which she was greatly reduced. This disease left much sensitiveness of the body, which prevented her wearing any artificial support. She married, and, at the age of twenty-three, became a mother; and from that time the curvature made more rapid progress, increasing greatly after the birth of every child.

I advised this lady to use one of my Patent Spine Supports, modified with an additional prop to suit the circumstances of her case. She was raised considerably by the application of the Support, and her figure was much altered for the better. She has now worn the Support one year with considerable advantage. Her general health is much improved, and her strength is greatly increased. She now takes walking exercise daily in the open air, with much comfort. Before the Support was applied she could not lift her child (two years of age) without great difficulty; but since she has worn it she can do so with ease. For the year previous to her consulting me she had been almost wholly confined to her couch, but during the last nine months she has not found this indulgence necessary: she is able to rise early and attend to the duties of her family. She exercises herself with freedom in her garden, and is accustomed to walk in the open air about two hours daily. She was previously sustained much by stimulants and medicines—to use her own expression, "she lived an artificial life." She at present takes the ordinary food of the family, which she finds sufficient for her nourishment.

This lady has again become pregnant, and now wears my Compound Adjustable Support, instead of my Spine Support, which she had previously employed.

CASE 37.

PLATE XXI.—Figure 45. *Represents the appearance of the Back before the application of the Support.*

„ 46. *Shows the degree of benefit produced upon the Spine and Chest by using it.*

Miss ———, æt. twenty-two, applied to me in consequence of the distress which she experienced from deformity of the spine and chest, the appearance of which is represented in Figure 45.

When she was about ten years of age she suffered from fever, and the curvature was first noticed soon after this, in consequence of the projection of the right shoulder. She was rendered very weak by the illness, but when she improved in strength the spine appeared to get better. When she was fourteen years old the deformity became more evident from the increased projection of the right shoulder, and a corresponding projection of the left hip. The deforming process now progressed rapidly. She had suffered greatly in the back, along the line of the left side, and also in the right side. The pain in the right side was very severe for three years before she consulted me. The urinary organs had become disordered, and she had great difficulty in relieving herself from time to time, and when the urine was passing she experienced great pain, accompanied with a burning and pricking sensation. The functions of the body were carried on irregularly. She suffered much from flatulency, indigestion, and bodily weakness. The weakness experienced in the back was so great for about eighteen months before I saw her, that she could not sit up, except for a very short time, without resting her elbows upon her knees.

This young person had nothing done for her with a view to restore the

spine, in consequence of her friends having been discouraged by their experience in the case of another sister, who was also deformed, and for whose restoration her father had expended large sums of money without alleviation of her sufferings: She was under the charge of Sir Astley Cooper, Sir William Blizard, and Dr. Horkness, for a considerable period without profit.

The pecuniary circumstances of my patient having become reversed, inconsequence of her father's failing in his standing as a merchant, she could not afford to give up her time to undergo a course of professional treatment; I could therefore only advise her to use my Patent Spine Support.

She has now worn the Support for about fourteen months, and she states that the immediate effect of its application was the removal of the pain in the right side, where she had previously suffered very severely. The difficulty which she experienced in voiding urine, and the pain which she felt in the urinary organs, was also immediately removed, and has not since returned. Her respiration has improved; she is free from the pain and weakness which she experienced in the spine and chest, and she is able to sit up at her work as a needle-woman without difficulty. Her appetite is good, she is free from flatulency and indigestion, and the natural relief of the body is regular. She states also that the deforming process was increasing rapidly when she came to me, but it will be seen by comparing Figures 45 and 46 that the curvature of the spine has rather diminished than otherwise under the operation of the Support. A few days ago she told me "she felt as one who had begun to live a new life."

Beneficial effects experienced by Labourers from the use of the Author's Patent Spine Support.

I have used the Support for the relief of labourers with considerable advantage, as will be seen by Cases 38 and 39.

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CASE 38.

PLATE XXII.—Figure 47. *Represents the state of the Back when the Author was Consulted.*

„ 48. *Represents the state of the Back after it had been subjected to the Influence of his Patent Spine Support.*

James Cox, an engine-turner, æt. twenty-three, has a double lateral curvature of the spine, and consequent deformity of the chest. The appearance of the back when he came to me is seen in Figure 47. The deformity commenced when he was about fifteen years old. He was at that time afflicted with bodily weakness following scarlet fever, and had been considered a delicate child. He suffers from weakness in the back and in the right arm; his right leg is also rather weak. It appears that in this case the curvature affects the whole of the right side.

This person, not being in circumstances to give up his time for professional treatment, could only have the advantage of my Patent Spine Support. He has now worn this contrivance about fifteen months, and it will be seen, by comparing the Figures 47 and 48, that a favourable impression has been made upon the spine by its use. The weakness in the back is not felt with the Support on. The right side, arm, and leg, are stronger. He finds the Support a great comfort to him in his work, and also in walking. His chest is better, and his breathing good.

CASE 39.

PLATE XXIII.—Figure 49. *Shows the figure of the Back when the Author first saw the Case.*

,, 50. *Shows the effect produced upon the parts by wearing the Spine Support.*

Charles Lane, æt. twenty-nine, came to me, having curvature of the spine, and consequent deformity of the chest, a view of which is given in Figure 49. He was unable to trace the commencement of the deformity to any cause. It did not come on after any particular disease or accident. He was a weakly child; the deformity was first noticed when he was about ten years of age in consequence of his habit of stooping. Soon afterwards he was employed at a pastry-cook's as an errand-boy. In this situation he was accustomed to carry weights upon the head, which were sometimes heavy. He remained in this employment five or six months. Some time afterwards he was engaged in the manufactory of a silversmith, where he was bound apprentice. This was in the year 1821. He has been in this employment up to the present time. The work in this factory is sometimes laborious, but he is not accustomed to carry anything upon the head.

I recommended this young man to wear one of my Patent Spine Supports. At first he experienced some inconvenience from it; but in the course of a short time it became easy and comfortable. It has removed the pain which he had previously experienced in the side, and he does not feel the weakness in the back from which he had suffered, except when he sits for a time without the Support. The deforming process has not only been stopped, but it will be seen, by comparing the Figures 49 and 50, that a favourable effect has been produced upon the curvature of the spine and upon the chest. The improvement in

SECTION I.

the chest is, however, less apparent in the back than in the front of the body. He has now worn the Support two years, and finds it a great comfort to him in his work.

Of Excurvation, or Curvature Backward, not arising from Disease in the Spine.

By curvature of the spine backward I mean those curvatures in which the convexity of the arch presents backward. Distortion of this description sometimes takes place from muscular weakness, independent of disease in the vertebræ, or intervertebral substances, as in Plate XXIV., Figure 52, where it is seen in its early stage.

We are unable to determine in some instances whether the primary cause of this complaint is weakness of the muscles of the back, or yielding of the bodies of the bones from unnatural softness of their texture.

This is a form of distortion which occurs at all periods of life, but from different causes. In young persons it is first noticed from their carriage in walking and their manner of sitting; and in its incipient form it is commonly called "a stoop."

In these cases there is at first no alteration in the form of the bones, or of the parts which lie between them; but as the curvature proceeds, or is suffered to continue, the bodies of the vertebræ assume a wedge-shape, the thinner part of which is placed anteriorly; the intervertebral substances also acquire this form; so that in the more advanced stages of this deformity both the bones and intervertebral substances are found of this figure.

As the distortion advances the person becomes incapable of sitting or of walking upright. In sitting, he places his elbows on something capable of sustaining the weight, so as to enable him to balance the

spine; or he places the lower part of the trunk towards the front of the seat of the chair, and throws the upper against the back for support.

The result of these changes in the form of the bones, and of the intervertebral substances in connexion with muscular weakness, as it is observed in the advanced stage of posterior curvature, is seen in Plate XXV., Figure 54. The curvature in this case had passed into the fixed condition—a condition which it is very difficult to remedy.

The scapulæ are sometimes altered in their situation. When the curvature occupies the dorsal vertebræ, which usually happens in this variety, the shoulders are frequently carried forward, and the inferior parts of the scapulæ backward, as is seen in Figure 52, Plate XXIV. This position of the scapulæ is favoured by any flattening of the sides of the chest in posterior curvature, as well as in lateral curvature. In posterior curvature the flattening of the chest laterally is usually on both sides; but in lateral curvature it is observed on the convex side of the dorsal curve; and often, more especially at the upper part. When flattening of the sides of the chest has taken place, the deformity is thereby rendered much more difficult to manage.

CASE 40.

PLATE XXIV.—Figures 51 and 52.

A young lady, æt. sixteen, was brought to me in consequence of an excurvation of the spine, as seen in Plate XXIV., Figure 52, and which was also accompanied with a slight lateral curvature, as represented in Figure 51. This lady experienced great weakness in the muscles of the back, in consequence of which the upper part of the trunk was thrown forward, producing a considerable stoop. The stoop had now become so permanent that she was unable to lift herself up into the natural erect posture. Her parents thought that she had acquired an awkward habit, and she was frequently reproved for not sitting or standing upright; but she felt her inability to do so, and

SECTION I.

her frequent attempts to hold herself erect seemed only to increase the evil.

Upon examining the spine, I found that the curvature had arrived at the second stage, the bones of the spine having become relatively fixed, so as to form a permanent deformity. This young lady was thin, and her health delicate; she was the subject of cough, and was frequently laid up during winter. The weakness in the back had been felt for several years, but the curvature had not attracted particular attention for more than about three years and a half before I saw her.

Various means had been tried for her relief, as reclining, the use of dumb bells, gymnastic exercises; but these means had only been followed irregularly from want of confidence in them. The gymnastic exercises were found to be too violent, and having met with an accident while employed in them, they were wholly discontinued. The deformity increased until she came to town, and was placed under my care.

I had recourse to my Patent Exercising Plane and Patent Spine Support, with such other measures as the state of the parts led me to adopt. She speedily began to improve, so that in the course of a fortnight, from the time she came under my care, her friends were impressed with the difference which had taken place in the state of her health and in the appearance of her figure. The same means were continued for four months, the exercises being carefully adapted to suit her strength. The curves in the spine gradually yielded—the shoulders assumed their natural position, the muscular strength was restored; and in the course of this time she became comparatively robust, and was able to carry herself erect. In order, however, to guard against the injurious effects of improper posture, and to steady the spine in its natural direction, I advised the continuance of the use of the Support; and, with a view to keep up the muscular strength, I also recommended her parents to allow her to continue her exercises on the Plane.

This case is illustrative of the beneficial effects produced where weakness is experienced in the muscles of the back; and of the restorative influence of the plan of treatment which was here followed, upon all the parts that were affected by the curvature. SECTION I. Remark.

Projection of the Shoulders forward with or without Excurvation of the Spine.

IN some cases there is a degree of excurvation of the spine, accompanied with considerable advancement of the shoulders forward, in consequence of weakness in those muscles, whose office it is more especially to draw them back. This malposition of the shoulders, and incipient deformity of the spine is represented in Plate XXV., Figure 54, C. Cause.

When this malposition of the shoulders exists without any manifest weakness in the muscles of the spine, I recommend the use of my Patent Body Support, furnished with bracers; I likewise direct the patient to use small bags of shot as dumb bells, for the purpose of exercising and strengthening the muscles of the shoulders which are defective in energy. Where there is evident debility of the muscles of the back, as in Case 41, I employ also my Patent Exercising Plane, and manipulate them daily. If the body be in good health, these means will be sufficient, in the course of a short time, to give tone to the muscles, and enable them to sustain the spine, chest and shoulders, in their proper relations with one another. Treatment.

CASE 41.

PLATE XXV. A.—Figure 54, C.

Master C———, æt. ten, a delicate child, was brought to me from Oxford, with incipient excurvation of the spine, and malposition of the shoulders, which advanced forward, and gave him the appearance of being very narrow in the chest.

SECTION I.

Master C. was placed in one of my Orthopedic Establishments, where I used for his relief my Patent Body Support with bracers, and regulated the employment of shot bags, and of my Patent Exercising Plane. These means, with manipulations of the weak muscles, were instrumental in producing a restorative action upon the parts which soon became manifest; so that in the course of six weeks I was able to send him to his friends, with the spine erect, and the shoulders in their proper position upon the chest. While under my care, the child became comparatively robust, and was greatly improved in strength: I recommended the use of the Support, to be continued for a time as a guard, and the shot bags and Plane for the purpose of adding still further to the strength of the muscles, and for keeping up the general tone and strength of the system.

OF INCURVATION ; OR, CURVATURE OF THE SPINE FORWARDS.

IN this deformity the convexity of the curve is placed anteriorly. It is the most uncommon of all the varieties of spinal distortion; it has been called by some, curvature of the spine backwards: I prefer the name incurvation or curvature forwards.

Causes.

I have never seen incurvation produced from mere muscular weakness, neither do I remember to have seen it occasioned by carrying heavy weights on the head or by lumbar abscess. Mr. Bampfield mentions a case of curvature of this description in the neck, where the occiput approached so nearly to the first dorsal vertebra, that the intervening space was only the breadth of a finger. This was in a rickety and diseased child.

I have seen this deformity only in the loins; and in the cases which have occurred in my practice, it has been apparently occasioned by the

contraction of the psoas and iliacus muscles which took place during the continuance of the disease in the hip joints, as in Plate XXXV., Figures 78 and 79, or from preternatural shortness of these muscles, independent of disease. In the instances which I have seen of this description, the deepest part of the curve has been at the junction of the last lumbar vertebra with the sacrum. See Plate XXV. A, Figure 54, B.

Treatment.

In the first class of cases I have used my mechanical bed with considerable advantage. This bed is made to operate upon the pelvis and upon the thighs in such a manner as to produce an extending action upon the psoas and iliacus muscles. The difficulty experienced in the treatment of this variety of curvature is, to fix the pelvis so as to enable the surgeon to keep up a steady extending action upon the muscles which require to be elongated. I used this bed in Harvey's Case with much benefit. Plate XXXV.

In those cases of incurvation which arise from want of development in the length of the psoas and iliacus muscles, there is ultimately formed a peculiar lateral hinge-like motion of the pelvis upon the loins, which is very manifest in the act of walking. During progression the upper parts of the sides of the pelvis approach the loins alternately in a remarkable manner. When the person throws the weight upon the right limb, the left side of the pelvis sinks, and the upper part of the right side is brought nearer than natural to the vertebral column; and when he throws it upon the left side the right side of the pelvis sinks, and the upper part of the opposite side is, in its turn, made to approach preternaturally towards the spine. These movements produce a very peculiar waddle, and great awkwardness in walking. The upper outlet of the pelvis is tilted unnaturally forward as the person stands erect, and the lower part of the abdomen is pendent and prominent. There is also a remarkable hinge-like movement of the pelvis upon the vertebral column backwards and forwards. The cur-

Section I. vature is consequently readily removed by placing the person in the sitting posture; and while he continues in this position there appears to be no unnatural inclination of the spine, but as soon as he assumes the erect position the curvature again returns. It is also removed by placing the patient on the back, and bending the thighs upon the body; but when the limbs are placed in the horizontal posture with the body, the curvature is again made manifest.

There may be cases of this description where it might be prudent to have recourse to the mechanical bed, which I used in Harvey's Case for the purpose of producing extension and gradual elongation of the flexor muscles of the thigh. In some instances it might be advisable to divide the tendons of the affected muscles; but I have not met with any in which I have judged it right to have recourse to these plans, either singly or combined.

I am not aware of any means by which this variety of incurvation can be effectually remedied. In the cases for which I have been consulted I have used my Patent Body Support with considerable advantage. The Support has been so modified as to make it more suitable for the purpose of affording relief than this apparatus would be if employed in such cases as it is usually constructed.

CASE 42.

Plate XXV. A.—Figure 54, B.

Fanny P———, æt. 13, was recommended to me by Mr. Mc Cann, surgeon, Parliament Street, in consequence of a curvature in her spine. I saw this child in consultation with Mr. Mc Cann, and found that the deformity consisted of an incurvation of the spine, which was formed by the lower lumbar vertebræ and the sacrum. As the child stood, the upper outlet of the pelvis was thrown unnaturally forward, and the

lower outlet unnaturally backward, the posterior part of the sacrum assuming nearly a horizontal line. The last lumbar vertebra was joined to the sacrum, so as to form nearly a right angle with it; and the vertebræ above inclined backward so as to maintain the equilibrium of the body in the manner seen in Plate XXV. A, Figure 54, B. In consequence of this arrangement of the bones, the abdomen was unnaturally protuberant and pendent, as might in a measure be inferred from the drawing.

The ligamentous connexion of the sacrum with the lower lumbar vertebra had become much elongated, and the opposing surfaces were so formed as to allow an easy hinge-like motion of the sacrum upon the vertebra. This movement of the pelvis was particularly manifested in walking, which was accompanied with a peculiar waddle. There was also a hinge-like motion of the sacrum upon the vertebra, which allowed the column of vertebræ and the sacrum to be brought into their natural line, when the child was placed in the sitting posture, and when she was laid on her back, with the thighs bent upon the trunk. In either of these positions it will be seen that the points of origin and insertion of the psoas and iliacus muscles were brought nearer together; but when the body was placed in the erect or horizontal posture, with the limbs extended, the incurvation was immediately formed, manifesting that the cause of the deformity was the preternatural shortening of the psoas and iliacus muscles, which was to such an extent as would not admit of these positions with the back in its natural line. This state of the muscles existed in infancy, and probably before birth.

When the child was about five years old the parents were recommended by their medical attendant to require her to lie constantly upon her back. This advice was followed for about eighteen months, during which she was only allowed to sit up to dinner; but without any

Section I. alleviation of the malady. Country air and sea-bathing have been tried on three occasions, but without improvement in the condition of the spine.

I recommended a modification of my Patent Body Support, from the use of which the child derives considerable relief.

SECTION II.

Of Distortion of the Spine arising from Disease.

Section II. This kind of deformity is preceded by diseased action in the inter vertebral substance, or in the bodies of the vertebræ, or in both.

Seat of disease. Varieties of distortion.

When one or two of the vertebræ are affected so as to produce extensive destruction of contiguous surfaces, the distortion assumes an angular form, as represented in Plate XXVI., Figure 56, or in Plate XXVII., Figures 57 and 58. When several of the vertebræ have suffered from absorption, the spine becomes curved at the diseased part, in such a manner that the convexity of the curve is placed posteriorly, as in Plate XXVI., Figure 55. The curve in these cases is more or less extensive, according to the number of the vertebræ involved in the disease. Sometimes the whole of the dorsal vertebræ are included in the curvature. When the disease occurs in this part of the spine, the curve is larger and less abrupt than when it takes place in the loins, because the closer attachments of the dorsal vertebræ together, and their connexion with the ribs, prevents in a measure the extension of one or two without drawing others into the curve. In the lumbar and cervical regions these distortions are commonly more angular than in the dorsal region. The upper part of the spine sometimes forms a right angle with the lower; in some still more dreadful cases, even an acute angle has been formed.

As the disease advances the person becomes incapable of maintaining the erect position, and in sitting he seeks to support the upper part of the body by resting his elbows on his knees, or on something on which he can throw part of the superincumbent weight of the body.

Weakness in the back.

The power of the muscles which are supplied with their nervous energy through the nerves which pass off from the spine, below the seat of disease, is gradually diminished. The person walks with a weak and uneven step; the weakness often increases until the muscles of the lower extremities are paralysed, and the person is rendered unable to stand.

Muscular weakness.

It is in angular projection that the most frequent instances of pressure on the spinal marrow occurs, producing paralysis of the lower limbs, of the bladder, rectum, &c. This effect would appear to be sometimes dependent on the extension of inflammation to, or effusion of some fluid on, the medullary sheath.

Angular projection.

The symptoms accompanying this disease of the spine will vary according to the region in which it is seated, the organs which are disordered in their functions being connected with the affected part through the medium of the nerves. If the disease be in the cervical region there is pain and difficulty in rotation and other motions of the head, and oppression in breathing will in some cases be one of the most marked symptoms. The functions of the bladder, rectum, and other internal organs, will be more or less deranged according to the seat of the disease, the rapidity of its progress, the extent of mischief which has taken place, and the degree of pressure produced upon the spinal marrow.

Symptoms vary.

The condition of the lower extremities, in a state of paralysis from this affection of the spine, differs from that which is observed in common palsy. The muscles have not that flabby feel which exists in a truly paralytic limb. There is not that looseness of the joints, nor that total incapacity of resistance, which allows the latter to

State of the muscles.

Sect. II.

be twisted in all directions; on the contrary, in cases of paralysis arising from pressure upon the spinal marrow, there is commonly more or less rigidity of the joints; the patient frequently suffers from cramp; and a sense of stricture and of stiffness accompanies every stage of compression of the spinal marrow, and indicates that the disease does not originate in the brain. These have been shown by many writers to be constant symptoms of paralysis, dependent on pressure of the medulla spinalis, as distinguished from that general relaxed state of the muscular system seen in paralysis from compression of the brain.

Paralysis without distortion.

Numerous facts prove the occurrence of paralysis in diseases of the spine without any distortion of the vertebræ. Some of the persons

The degree of muscular debility differs.

suffering from this disease are totally incapable of walking at a very early period of it; others can do so by the help of crutches, or by grasping their thighs; some can sit in a chair, which others are incapable of doing; some have a certain degree of command over their legs, and can move them in bed; while others are totally dependent on assistants for every change of position.

Effects.

This disease does not commonly kill, but the persons affected by it are thereby rendered unfit for many of the active duties of life.

Treatment.

The most important part of the treatment in these complaints, during the continuance of the diseased action, is the prevention of pressure operating upon the affected surfaces, and of friction arising from the various movements of the spine. If the diseased action be severe, the patient should be confined to the horizontal posture, and be placed in that position most favourable for the removal of inflammation.

Patent Spine Support.

In connexion with the various remedies recommended in cases of diseases of the spine, I have found my Patent Spine Support one of the most valuable. This apparatus can be worn by the patient, whether he be placed in the horizontal, or allowed to assume the erect position. The beneficial effects which are observed to arise from the use of this

apparatus, modified to suit the particular case, are very great, and they appear to be produced by relieving the diseased parts in a great degree from the consequences of the superincumbent weight, and by steadying the spine, so as to prevent as far as possible the surfaces of the inflamed and carious vertebræ rubbing upon one another. The parts are thus, in many cases, delivered in a measure from the influence of pressure and friction, the principal local causes which tend to keep up and increase the diseased action in the spine, when it has once commenced.

Lessens pressure and friction.

The Support acts also very favourably upon the projections which may have taken place in the spine and chest, preventing the increase of deformity, and in some cases diminishing the extent of distortion which may have already become manifest. See Case 47, Plate XXVII., Figure 57, compared with Figure 58.

Tends to reduce the distortion.

The Support is also found to lessen the sufferings, and to act favourably upon the health by diminishing the causes of derangement.

In cases of disease of the spine it is commonly most desirable that the sufferers should be much in the open air, which, when it can be accomplished without increasing the mischief in the spine, tends to strengthen the system, and is beneficial to the health. Persons wearing the Support may often be permitted to be in the open air with impunity, with a state of disease in the spine so great, that if they were moved from their beds without it there would be danger of increasing the diseased action, and thereby of occasioning more injury to the spine and to the health of the sufferer than the open air and all other means commonly employed could counterbalance. These facts are illustrated by the following cases.

Guards the spine from injury.

CASE 43.

PLATE XXVI.—Figure 55. *The Deformed State.*

Miss H———, æt. six, was brought to me in July, 1838, with distortion of the spine arising from disease of the vertebræ. The dis-

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tortion presented the appearance seen in Figure 55. This child's constitution was weak, but her disposition was lively and amiable. About eighteen months before I saw her she became afflicted with superficial sores at the upper and back part of the thigh; and about twelve months before I was consulted, attention was drawn to the condition of the spine in consequence of its having been observed that her height was diminished. Upon examining the spine it was discovered that one of the dorsal vertebræ projected backward. She was immediately submitted to the care of a surgeon in London, who placed her on his couch in the prone position, and ordered her a generous diet. She was kept on the couch, resting on her chest night and day, for about eight months. Her health and strength gave way under this treatment, and the deformity increased rapidly.

This child was brought to me in a weak and delicate state; her breathing was much affected; sometimes to a very alarming degree. She was able to walk, but with a slow and unsteady step. I ordered for her my Patent Spine Support, carriage exercise, and a generous diet. In the course of a few days she felt the benefit of the Support; she became stronger upon her limbs, and stated that she experienced much support and comfort from its use. About six weeks after she was placed under my care I sent her to Margate, where she continued until the 4th of December. There she was in the open air about four hours daily as long as the weather was favourable. I saw her on the 10th of December and found her strength much increased and her health greatly improved. I now compared her back with a cast which I had taken when she first came to me, and my impression was that the distortion was rather diminished than otherwise. She still finds so much benefit in the use of the Support that she is unwilling to have it removed even for a short time.

It should be mentioned, in connexion with this case, that the respiration was so much affected before the application of the

Support, that when her mother brought her the distance of ten miles to see me, though in her private carriage, she was obliged to stop by the way, and seek for medical aid, in consequence of the distress in breathing which the child experienced. It is gratifying to observe, however, that there has been no return of this distress since the Support was first applied.

CASE 44.

William Cooper, æt. thirteen, was brought to me from Farnham, in April, 1839, with a posterior curvature of the spine, arising from disease in the vertebræ. The curvature included four of the dorsal vertebræ. The child had been ailing about three years before I saw him, and about two years before I was consulted the curvature of the spine was discovered. He had lain upon his back four months, and blisters and issues had been applied contiguous to the diseased parts. He became very weak. When he was allowed to leave his bed he could not walk without a stick, and then tottered very much. He suffered from cramps in his lower limbs. When I saw him he looked weak and delicate; appetite not good; subject to night-sweats; bowels obstinate; slight cough.

I ordered for this child my Patent Spine Support. The Support was applied and he *immediately felt stronger*, and he was able to walk better than before its application. In the course of a fortnight from this time he threw aside his stick and was able to resume his studies. The pain which he had experienced in the back wholly subsided in the course of seven weeks, and he continued to gain strength. He came to see me on the 4th of December, 1839: he was now looking well; his back felt strong; he was firm upon his limbs; his appetite was good; bowels regular; he was free from night-sweats, and the cough had left him. I recommended the continuance of the Support for a time, in order to steady the spine and guard it from injury.

CASE 45.

Master Painter, a weak and delicate child, was brought to me in December, 1838, with disease of the spine, occupying the middle of the back. The spinous processes of several of the dorsal vertebræ projected backward; his lower limbs were weak, and his walk cautious, awkward, and stooping. He was glad to support himself when standing by placing his hands on his thighs, or his elbows on his knees as he sat.

I applied for the relief of this child one of my Patent Spine Supports; and recommended nourishing diet. He speedily found great comfort from the use of the Support: carried himself much more erect; was firmer upon his feet; walked with more confidence, and did not appear to require to rest himself upon his hands and elbows as before. After a short period he was sent into the country, and was not brought to me again until May 8th, 1839, a period of about three months. At this time he appeared to be losing strength. I examined the Spine Support, and found that it required regulating, and consequently did not sustain him sufficiently. This should have been attended to much earlier. I could not say that at this time any material change had taken place in the position of the diseased vertebræ. The weakness in the lower extremities had again increased, and he stooped more in walking than he did when he left town. I regulated the Support and sent him into the country again for six weeks.

CASE 46.

Miss ——, æt. six, was brought to me with deformity of the Spine arising from disease of the bodies of the vertebræ. The parents state, that she fell down stairs about twelve months before I saw her; she cried very much at the time, but it was not supposed that any ma-

terial injury had been sustained: she complained, however, to the governess from time to time when standing in the school-room. About five weeks after the accident, it was discovered that the child had a slight projection of the vertebræ of the back, but this was not accompanied with any distress in her health, or any weakness of the limbs. Mr. Watts, the medical attendant of the family, was immediately called in. Mr. W. prescribed leeches, and afterwards a blister, which were applied on each side of the spinous processes of the projecting bones. She was also ordered to lie on the back, but the child being lively they could not have confined her without coercion. There was tenderness felt on pressure, but she did not appear to suffer in any other way. The deformity continued to increase, and as it got worse her health became affected, and she experienced weakness in the limbs, accompanied with cramps; she also felt pain in the abdomen. She fell away greatly during the six months previous to my seeing her, and was, when she was brought to me, weak and delicate, and was suffering from general distress of the system, evinced by loss of appetite, disturbed sleep, pains in the abdomen, cramps in the limbs, &c. I ordered my Patent Spine Support for this child, from which she felt much comfort; the body being greatly supported and steadied by its action. She has now worn the Support about three weeks, during which period she has not suffered from the pain in the abdomen, except one morning when the Support was taken off to have some little alteration made in it, and then the pain in the abdomen returned, but it was again removed when the Support was re-applied. She suffered very much from cramps in the limbs for some time, every night before the application of the Support, but for the last two nights her sleep has been tranquil, and she has not been afflicted with them, February 14th, 1839. She is much pleased with her Support, and would be unwilling to discontinue it.

I recommended the parents of this child to take her to their country

SECT. II

residence and place her under the care of their family surgeon, Mr. Watts, who some time afterwards wrote me the following letter:—

Frampton-upon-Severn, near Dudley,
December 4, 1839.

DEAR SIR,

I HAVE great pleasure in stating to you, that the Support with which you furnished a little patient of mine has been attended with very great benefit. Although there was disease of several of the vertebræ, it effectually relieved, in the very first instance, the distressing pain about the precordia, arising from pressure on the spinal cord, and which was very harassing night and day. She can now walk with considerable firmness and not very much deformity; unfortunately, however, an abscess has made its appearance below the diseased bones, which I fear has connexion with them. My chief reason for writing to you now, is to mention that it is highly necessary to have a new Spinal Support, as the one she now wears is too small for her. I therefore am requested to tell you, from her father, that he proposes to be in town to see you at the end of this month.

I am, Dear Sir,

Yours truly,

To Jos. Amesbury, Esq. THOMAS WATTS.

CASE 47.

PLATE XXVII.—Figure 57, *Shows the form of the Back before the Support was applied.*

„ 58, *Shows the Improvement which had taken place after it had been worn Fourteen Months.*

Miss Jaques, æt. two years and a quarter, the daughter of a respectable tradesman in Jermyn Street, St. James's. This child's constitution is remarkably delicate. When she was about two years old, a small

abscess formed in the skin just below the knee-joint, which healed very slowly. After this, small superficial abscesses formed at various periods and in various parts of the body; some of these disappeared, leaving only a mark on the skin; in others the abscesses burst, and continued open for several months. The state of her health was variable, and it became much disordered from the slightest causes. Her appetite was bad, but the bowels were for the most part regular. Her sleep was much disturbed, and she was timid and irritable. When she was about two years and a half old, the spine began to be affected, and the diseased action was soon made manifest by a projection of the spinous processes of three of the dorsal vertebræ. I ordered for her nutritious diet and country air, with rest in the horizontal posture, first upon the back and then upon the chest, with such medicines as her condition required. She was not wholly confined to the lying posture, but was allowed to crawl about the floor as she felt inclined. The distortion which was formed in the back was not diminished by these means. When she became stronger, she was permitted to walk, and now the distortion rapidly increased, so that in the course of four months, while she was in the country, the difference which took place in the spine was very considerable.

Previous to this period I had not employed my Patent Spine Support in cases where the spine was manifestly diseased, but upon carefully considering the nature of these cases, I saw no reason why it should not be had recourse to for the purpose of affording relief. When I had made up my mind as far as I could, by reasoning upon the subject, I recommended the parents to allow me to try the effect of this Support upon their child. They at once acceded to my recommendation, and a Support was prepared for the child under my direction. The distortion had at this time arrived to the degree represented in Figure 57, which is also shown in a cast now in my possession.

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Upon the first application of the Support the child felt irritated, but in the course of a few days she began to feel comfort from its use. Before it was applied she could not be moved without considerable distress, which was expressed when she was turned in bed at night or lifted in any way. She was always afraid of being moved, but since the Support has been employed she has borne change of position, and has been lifted without producing pain, and the fear of being hurt which she had previously manifested soon subsided altogether. At this time she was unable to walk.

When she was about four years old, an abscess formed on the side of the loins, which arose from the disease in the vertebræ above. The Support was continued, and so managed as to maintain its action upon the spine, notwithstanding the existence of the abscess. In about four months after the formation of the lumbar abscess, she was again enabled to walk a little, but in a short period after this another abscess formed in the upper part of the thigh, which appeared also to arise from the diseased action going on in the bones of the back. This abscess, like the former, was punctured, and the punctures healed, but they afterwards ulcerated, and both the abscesses continued open for many weeks.

April, 1839. It is now about fourteen months since Miss Jaques began to wear my Patent Spine Support; she at present walks about the house, but not without limping, which arises principally from the state of the muscles of the thigh, which are still stiff from the effects of the abscess which formed round the hip joint. Her health has been better during the last six months than it was during the previous six years, and she is at this time looking fresh and well.

Figure 58 represents the state of the back as it appeared about fourteen months after the Support was first applied, and it will be seen by comparing this Figure with Figure 57, that a considerable

diminution in the distortion of the vertebræ has been effected by its operation *. SECT. II.

General Observations.

The effects of the Author's Treatment of Spinal Deviations, especially in respect to its influence upon Life and Health.

I HAVE now had the treatment of a large number of cases of distortion of the spine and chest, partly arising from weakness and partly from disease; and I think it right that I should here state the result of my experience, as far as the same is connected with the future life and health of persons submitted to the operation of the means which I am accustomed to employ.

In the first stage.

In the early stage of spinal curvature, unaccompanied with disease, I find the judicious employment of my Patent Exercising Plane, with manipulations of the muscles, followed by rest in favourable positions, sufficient, under ordinary circumstances, for the removal of the curvature. This plan increases greatly the tone and strength of the system; and in cases where the health is impaired, it has always been found to have a powerful effect in restoring it. Parents cannot be too particular in having recourse to treatment in the beginning of lateral curvature, as at this period the deviation is commonly removed without the employment of any adventitious Support of the description which is needful in the more advanced stages of these complaints.

These cases require close attention, usually from three to four months.

In the second stage.

In what I have called the second stage of lateral curvature, the con-

* March, 1840. I have recently seen this child, whose health continues good. I compared her back with Figure 58, and found that during the last twelve months a still further improvement has taken place in the figure of her spine.—*Author.*

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ditions of the bones, muscles, ligaments, nerves, blood-vessels, and other organs, differ considerably in different cases. In the more favourable cases of this description the bones may be brought up to their natural relative positions, and the other parts may be restored by the employment of the means which I have introduced without any danger of injury to the chest or other parts, provided the treatment be carried on in a judicious manner.

Upon the health.

In the cases of this description, the treatment of which I have had to manage, I have found the state of the health and the bodily strength of the patients have been improved during the operation of the means employed for the reduction of the curvatures. In two cases an unusual degree of plumpness from an accumulation of fat existed, and in these a considerable diminution of size took place during the treatment, and a more delicate appearance was induced; but this change in the condition of the body does not appear to have been in any way detrimental.

In one case a peculiar neuralgic pain came on in the chest when the Support was applied, which after a time led to its being discontinued. I have never well understood in what manner this pain was produced. It might, however, have arisen from irritation occasioned in some small branch of a nerve in consequence of the change which had taken place in the spine and chest under the operation of the means employed. As soon as the Support was removed the pain subsided, and when it was again applied it returned; so that at last it was deemed prudent to discontinue it altogether.

Upon the function of respiration.

Where one side of the chest moves extensively during respiration, and the other only in a very slight degree, the operation of the Spine Support causes the patient to labour in breathing. This, however, is restorative, and is ultimately beneficial by bringing into action that side of the chest which was almost quiescent, while the preternaturally extensive movements of the other are retarded. I have never seen any injury arise from this cause in such cases. The heart and lungs are

unimpaired; the functions of the alimentary organs have been in almost every case much improved, and the strength and health of my patients have generally increased in a corresponding degree.

Time necessary for restoration.

In these cases the deformity of the spine is, for the most part, nearly or quite removed in periods varying from eight to twelve months. After this the parts require to be supported, and the exercises to be continued, as I have said, for a time, the length of which varies according to the age and strength of the patient, and other circumstances by which the restorative process may be influenced.

Worse cases longer under treatment.

In less favourable cases, the curvatures have commonly existed for a longer period, the bones are more altered in figure, and the parts have become relatively more fixed. In these cases the spine cannot be restored with safety in the longest period I have mentioned: much more time is necessary for the reduction of the curves. If the treatment be hastened, there is danger of injuring the health, and of producing injurious contractions of the chest. It is better, if time be an object, to be content with a smaller degree of benefit, than to hasten the restorative process out of its due course.

Reduction of the curves not always effected.

In some of these cases the spine cannot be brought up to its proper line; but as far as I remember, there is scarcely one case which I have had to manage in which the patient's figure has not been improved by the treatment that I am accustomed to follow.

In the worst cases of lateral curvature some benefit attainable.

In still more aggravated cases which are of the worst description of lateral curvature, I find some impression can be made upon the parts so as to improve the figure; but in these cases the whole chest is commonly so much deformed and contracted, that little good can be effected after the growth of the body has ceased, and in some instances even during this period, it is not advisable to recommend any thing to be done beyond the use of my Patent Spine Support, which should be worn in such a manner as to give ease to the patient and to prevent the deformity from increasing.

SECT. II.

Effects of the Support upon the bodily feelings.

When the Support is worn for curative purposes, and not for support only, some uneasiness is occasionally felt from its action, which, however, is readily removed, and in the more favourable cases of curvature in the second stage its operation is considered a comfort by the wearers rather than otherwise, from its first application. In such cases it relieves the pain and sense of weakness frequently experienced in the back; and in other respects it is often found more comfortable than the ordinary stays.

In bad cases, its curative action rendered more powerful.

In cases in which the deforming process has made greater progress, and where the curves are very firm, inconvenience is occasionally felt more or less from the operation of the Support; this arises from the nature of the curvature, which requires the Support to act more forcibly than in cases which are less securely fixed: but in these the Support is not permitted to distress. The operation of the Support in these cases is necessarily made stronger in order to overcome the resistance, but if it be found to irritate the skin at any point, in consequence of the stronger action which it is required to produce, the part is at once relieved by altering it.

Not injurious to the form of the hip bones.

It is stated by Mr. Wilson that the Crutch-Supports, which are made to bear upon the hips, sometimes affect the bones injuriously; this effect I have never seen produced by my Patent Spine Support. The difference arises probably from the bearings in my Support being dissimilar from the bearings of those which have been commonly employed; and from their continuing to diminish gradually as the curvatures are reduced.

Health not impaired by the treatment.

It might be expected that where the changes take place so rapidly from the deformed to the more natural figure, that the health would suffer materially during the treatment, especially in bad cases. It is astonishing, however, to observe, that even in the worst cases the health is rarely disordered by it; on the contrary, it almost always happens that the health and strength of the patients are

improved during the operation of the means employed. This is to be attributed to the relief which the internal organs experience by the reduction of the curvature, and to the strengthening influence of my Patent Exercising Plane. In two or three cases where the restoration was hastened, the health suffered slightly for a season, and it might have been in a measure from this cause. I could not say, however, decidedly that this would not have happened had the treatment not been resorted to. Though the means employed are found generally to increase the health and strength of the patients, removing various obstructions, nervous affections, &c., yet they are not to be regarded as shielding the bodies of those who use them from the attacks of all diseases.

Treatment not irksome nor distressing.

Body and mind duly exercised and strengthened.

The treatment is far from being irksome or distressing. It demands activity of body proportionate to the strength of the patient, and at the same time allows opportunity for the culture of the mind. In some cases the parts cannot be fully restored without much time and perseverance, and in others it would be in vain to attempt it; but it is gratifying to be able to state that the degree of improvement which can be obtained during the treatment might afterwards be preserved, and there are very few cases of distortion of the spine where some degree of benefit is not attainable.

Body and mind suffer from deformity.

In a former part of this Work I have stated what is well known to, and acknowledged by, all ingenuous and experienced observers, that deformity of the spine and chest is more or less detrimental to the health of those in whom it exists; physically giving rise to a continual injurious influence upon the system, affecting directly or indirectly the condition, the development, and the functions of the various internal and other organs of the body; and in a moral sense, generally depressing the spirits, and frequently warping the temper: thus producing many mental and other maladies which tend to shorten the lives of the sufferers.

SECT. II.

Professional fears unfounded.

Much apprehension has been entertained by medical men and others, lest the operation of the means which I employ in the treatment of Spinal Distortion should be directly or indirectly injurious to the general health. My practice, however, evidently shows that this feeling has been entertained without any sufficient foundation in fact; on the contrary, it may be seen from the cases which I have reported, and from what I have said, that deformity of the spine and chest might be diminished and frequently removed, and the health of those who are suffering from it at the same time repaired and strengthened. If then it be granted, which no properly experienced person can honestly deny, that spinal deformity is productive of various bodily and mental disorders, which embitter life and tend to bring those who are afflicted by them down to death prematurely, I might fairly assert that persons so relieved or cured, by my treatment, are placed in a far better condition for the enjoyment of temporal existence, and for accomplishing in this world the number of their days, than they could possibly have been had they abstained altogether from the employment of the means by which their relief or cure has been effected.

By the Author's treatment bodily distress diminished or removed. Figure improved.

Health and life prolonged.

Professional prejudice.

A prejudice exists in the minds of some surgeons, not arising from any just knowledge of my mode of treatment, but from the belief that these cases are of such a nature that we ought not, it would seem, to expect to arrive at any improvement by which they may be safely met and overcome. This is so strongly impressed upon the minds of some even of the most eminent, that they are accustomed to leave the deforming process to take its course, administering only such means as in their judgment are likely to be profitable to the general health of their patients; forgetting, I will not say willingly, that the deformity of the spine is the root of the bodily and mental maladies which they seek in vain to remove,—combatting the symptoms and leaving the cause untouched—attacking the shadow and leaving the substance. Is this prejudice to be continued? Are those for whose

maladies remedial means exist, to be persuaded not to use them? May their minds not be relieved? May their natural figures not be restored? May they not be preserved from all those evils attendant upon the progress of distortion? Is it so, that in many of these cases the prospects, the health, the life, must be sacrificed to the baneful influence of these complaints? Will those who turn away the afflicted, seeking relief, from a course of proceeding by which they may obtain it, not suffer themselves to be convinced, and when convinced, will they still maintain the same opinions? Will they continue to assert, because they have asserted, that improvement may not be expected from treatment, except such as may be derivable from country air and gymnastic exercises? Must parents still suffer their afflicted children to remain afflicted, or reluctantly turn from their usual medical advisers and seek relief elsewhere without their sanction? Are there men who have attained the highest professional standing, who affect to despise and count as evil what they themselves have not originated or do not understand? Will the men accounted liberal and honourable, and who hold up the reputations of those which in their days *their contemporaries* sought to destroy, walk now in the same steps and show themselves to be their worthy descendants, rather than manifest a more noble and generous spirit? Oh! that some men could blush and be ashamed!

The Operation of M. Hossard's Apparatus, as used by himself and Dr. Tavernier, compared with the Author's Patent Spine Support.

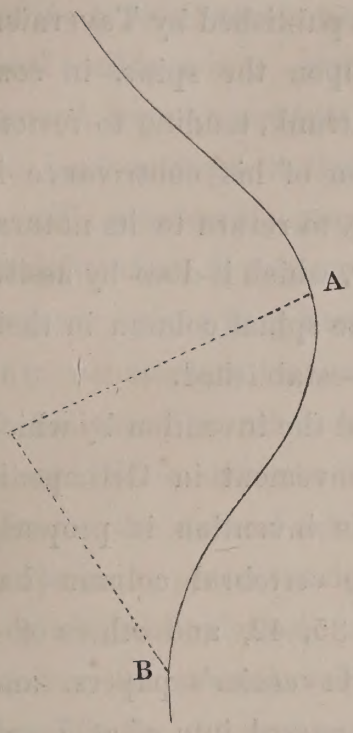
I think it needful, in passing from that part of my work which relates to the various distortions of the spinal column, to make some remarks upon the apparatus invented by M. Hossard of

Angers, and employed by himself and Dr. Tavernier of Paris, in order that I might point out the difference in the operation of M. Hossard's contrivance and that which I call my Patent Spine Support; and thereby seek to remove from the mind of the profession and the public the false impression which at present exists in France, and in this country, respecting the nature of my Patent Spine Support.*

Soon after my patent was sealed, and not before, the report of the invention of M. Hossard was brought to me. From that time to this I have been seeking to get information respecting the nature and operation of Hossard's contrivance, but was not able to obtain anything satisfactory, upon these points, until nearly all the former part of this work was sent to press. It was more especially needful, for the sake of my own reputation, independent of every other consideration, that I should make inquiry, and endeavour to ascertain whether, in construction or in operation, Hossard's invention and my Patent Spine Support are in any respects similar.

I have now in my possession the account of the operation of M. Hossard's contrivance published by Dr. Tavernier of Paris, with drawings showing the apparatus in use; and from this published statement, and from the testimony of those who have worn this contrivance, and from those who have been in the habit of applying it to the persons of their children, while under the care of Dr. Tavernier in Paris, and from a pattern of it placed in my hands, I am able to state distinctly that there is nothing in common in the mechanical construction of Hossard's invention and my Patent Spine Support. The operation of his apparatus proceeds upon a principle which Dr. Tavernier does not notice, and which I have nowhere seen explained, in reference to the action of mechanical appliances to the hu-

* It is reported in France that my Patent Spine Support is Hossard's contrivance, of which I have obtained possession, but that I know not how to use it.—*Author.*

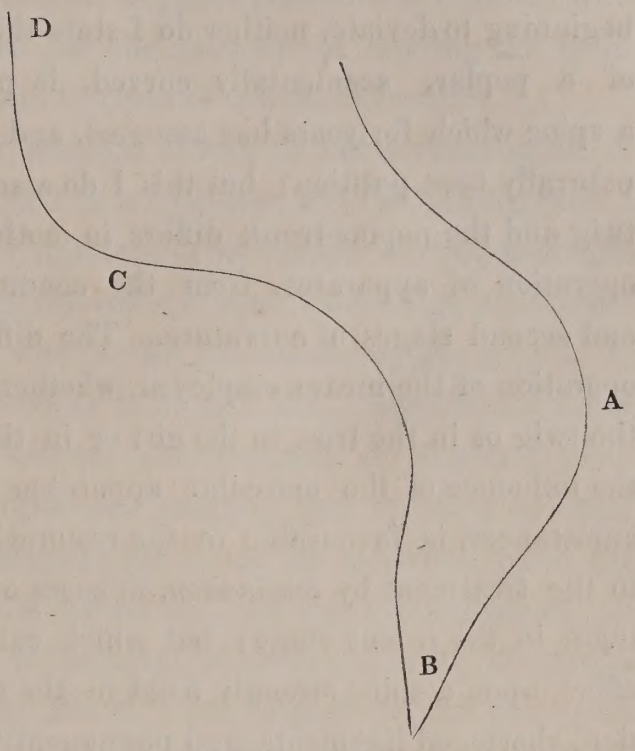


man body, but which I have embraced, with many others, in the construction of my Patent Spine Support—I mean the principle of antagonization; and it is only in so far as this one principle is carried into effect by Hossard, that his apparatus has, in my opinion, directly or indirectly, been found to produce any beneficial influence in cases of lateral curvature of the spine, all others being left by him, as far as I can discover, to the repairing powers of the constitution. The action of Hossard's contrivance consists in making two parts of the curved spine assist mutually in the reduction of the curvature, upon the principle of antagonization. This will be rendered more evident by referring to the diagram. The curved line A, B represents, with sufficient accuracy, that variety of lateral curvature shown in this work in Plate XIX, Figure 42, and all the cases shown in Tavernier's printed account. The mechanism of the apparatus is so arranged as to cause the pressure which is applied by it to the middle of the curve at A to be transferred to the other side of the lower end of the curve at B, nearly in the direction of the dotted lines; therefore, whatever amount of pressure is applied to the centre of the curve at A, the same is made to operate in the opposite direction on the lower end of the curve at B. The tendency of the apparatus operating in this way with a pushing and pulling action, antagonising each other, is to bring the two projecting parts of the distorted spine into the natural centre of gravity, which effect, the natural contraction of the muscles materially assist to accomplish; and I have no doubt that, in cases where the

deviation is such as is shown in the Figures published by Tavernier, Hossard's invention has a powerful effect upon the spine, in connexion with the action of the muscles of the trunk, tending to restore it to its natural position. The operation of his contrivance is that of inclining the spine, which is deviating, to return to its natural direction during the future growth of the body, which it does by assisting the muscles to maintain the bones of the spinal column in their due relations, until the balance of power is re-established.

This is called "Méthode d'Inclinaison," and the invention by which it is accomplished is regarded as a great improvement in Orthopedic surgery; but I think it will be seen that this invention is properly applicable only to curvatures in which the vertebral column has deviated in the direction shown in Figures 35, 42, and others of a similar description in this work, and in Dr. Tavernier's papers, and in such cases only before the distortion has passed into what I call the second stage.

The natural tendency of the life given to the human body, by the Creator of all things, is to erect the perfect form of man, and the natural form of man is upright. The body, by the influence of weakness and disease, may deviate from its natural direction; and it often happens that nothing more is necessary than to resist the deforming process by mechanical means, so applied as to operate effectually in accordance with the principle of life. If I have been able to inform myself correctly respecting Hossard's contrivance, it is, in my judgment, only properly applicable in the very beginning of spinal deviation; and, though its operation would be the same in all the stages of that variety of curvature which I have mentioned, yet its effects would be very slight and very slowly manifested in cases even of this description after they become firm, or, in other words, have passed into the second stage. We may



incline a twig whose natural tendency is to grow upward, from an accidentally bent position, so that it will afterwards grow straight: thus, if pressure be made upon a twig bent as in the diagram, so that it shall steadily operate at A and B, in opposite directions, the natural force of the living powers in the tree will cause the twig to recover its natural line, provided the external mechanical pressure operating at A and B be judiciously applied; but if this be employed too forcibly, the upper end of the twig A, B would be turned over too much, and so as to form the line shown at C, B, and in that case another curve would be formed above during the future growth of the twig in the line C, D, and in process of time the original curve would probably disappear. If, however, the curve A, B, in the above diagram, be made to represent a poplar-tree thus accidentally bent, and a force be applied so as to operate as in the above example at A and B, and made to produce its influence as in the former case at A and B, in opposite directions, —how little effect would be produced upon the tree, how slowly would it alter its unnatural inclination! If the force applied upon the principle of Hossard's invention were sufficiently strong, the tree might be brought over to the direction of the line C, B, in the diagram, and may afterwards assume, in a measure, the direction of the line B, C, D, but probably it would never attain to its natural upright position. I do not mean to say that the condition of a bent twig operated upon

by external forces is precisely similar to that of a young spine beginning to deviate, neither do I state that the condition of the trunk of a poplar, accidentally curved, is precisely similar to that of a spine which for years has assumed, and has become firm, in an unnaturally bent position; but this I do assert, that the condition of the twig and the poplar-trunk differs in nothing, so far as respects the operation of apparatus, from the condition of a spine in the first and second stages of curvature. The difference consists not in the operation of the means employed, whether to reduce the curvature in the twig or in the tree, in the girl or in the woman, but especially in the influence of the muscular apparatus which, under ordinary circumstances, is favourable to the restoration of the parts submitted to the treatment by *Inclinaison*, in cases of deviation of the spinal column in the recent stage; but which can have very little restorative effect upon a spine strongly fixed in the unnatural position by adhesion, shortened ligaments, and permanently contracted muscles.

From this argument I infer that the "Méthode d'Inclinaison" may, with judicious management, be rendered profitable to persons suffering from the variety of spinal deviation represented in Tavernier's Figures while the deviation is in the unfixed state, and that, in proportion as the spine becomes fixed in the unnatural position, this method becomes ineffectual in restoring it to its proper line.

While I agree with Tavernier in most of the statements which he has made against the reclining and stretching modes of treatment, and the inefficiency of gymnastic exercises and all the usual apparatus made to support the spinal column, and acknowledge with pleasure the improvement which Hossard has introduced, yet I must be understood to state, distinctly and unequivocally, that I had no knowledge whatever of their opinions upon those subjects, or of the mechanism or action of Hossard's invention, until after my Patent Spine Support was in full operation; and it is only within the last few days that I discovered that there is anything, even in principle, in Hossard's

contrivance, which my Patent Spine Support possesses in common with the invention which he uses for the purpose of altering the inclination of the vertebral column, in cases of lateral curvature.

It was not my intention to mention Hossard's contrivance at all in this work; neither indeed was I in a condition to do so, seeing that I was, until recently, altogether ignorant of its mechanism and principle of action; but now, having arrived at some knowledge upon these points, it is a duty which I owe to the profession, to the public, to Hossard and Tavernier, as well as to myself, that I should not suffer this work to be published without endeavouring to disabuse those who have been misinformed upon this subject, and to show in what respect my Patent Spine Support differs in its operation upon the body from that of Hossard's invention. In the mechanism of my Patent Spine Support there is nothing in common with Hossard's invention, as I have before stated. In respect to the principles embraced in the construction of my Patent Spine Support, I find his Invention has, as I have said, one principle in common with mine, and, as far as I can find, only one, namely, antagonization. By Hossard's contrivance this principle can be very imperfectly carried into effect, and consequently his apparatus must necessarily be very limited in its application, even in cases of lateral curvature. As far as I am able to discover, it is only likely to be profitable to the patient, even in the recent stage of lateral curvature, when the spine deviates as represented in the Figures contained in Dr. Tavernier's paper, and in cases where the deviation is of the same description, but with the centre of the curve projecting on the left side of the body.

It is not my intention in this volume to enter into the mechanical construction of my Patent Spine Support, but here I would simply contrast its operation upon the human body, in order to show how very far these two contrivances are dissimilar in principles and action. I think the following comparison will tend to set this question at rest.

First, then, I would say upon the grounds above stated, that Hossard's invention is only properly applicable to one description of curvature, and that in the recent stage. My Patent Spine Support is beneficially employed in the treatment of *all* the varieties of lateral curvature that have come under my observation in the *advanced* as well as in the recent stage.

Secondly. Hossard's invention operates upon *two points of one curve*, namely, at the centre of the arch and at the lower end; my Patent Spine Support operates upon the centre of the arches of *all* the curves, and also upon their ends.

Thirdly. The action of Hossard's apparatus tends to incline the spine to take the proper line, aiding it to do so in a limited number of cases with the curvatures in the recent stage, and it is dependent upon the natural powers of the muscles and the influence of gravity to effect that which could not, by it, be otherwise accomplished; and in cases where the muscles are paralysed it can be of little use, even in this stage. My Patent Spine Support operates not only with an inclining action, but also, if need be, with *a lifting action*, independent of the operation of the muscles.

Fourthly. By Hossard's contrivance two projecting parts of one curve are principally acted upon; namely, the centre of the arch and the lower end (see Diagram, page 131), which are made to operate upon each other with an antagonising action, whereby they tend, through the medium of the apparatus assisted by the muscles, to bring each other into the natural centre of gravity. By my Patent Spine Support *all* the unnatural lateral projections can be made mutually to assist in reducing each other through the whole line of the spinal column.

Fifthly. In Hossard's invention there is no means of bringing the lower part of the trunk to its proper relative bearing upon the lower limbs, except in so far as it may be inclined to go by the "Méthode d'Inclinaison." By my mode of proceeding, I gradually place the

lower part of the trunk in its proper centre of gravity upon the lower limbs, and when it is there I prevent it from deviating by the operation of my Patent Spine Support.

Sixthly. In many cases of lateral curvature the chest has sunk so much in consequence of the depth of the curve, as in Plate XXV. Fig. 53, that it could not be inclined to rise up into its proper position by the application of Hossard's invention. By my plan of proceeding I gradually lift up the chest, making the projections themselves to assist in reducing the curvatures of the spine, as far as it can be done with safety, until, in many cases in which Hossard's contrivance would be perfectly useless, the vertebræ are brought into their natural bearings upon each other, presenting no longer the appearance of a bulging wall, but rather the appearance of one in which every stone is made to bear its proper superincumbent weight. This is gradually accomplished by the hand of the surgeon, as the deformity gives way under the operation of the means employed; and, in proportion as it can be accomplished from time to time, so is every degree of reduction that can be effected fully maintained by the operation of my Patent Spine Support.

Seventhly. In Hossard's invention there is no means for steadying the spine in its proper direction when the curvatures are reduced in cases of great relaxation of the spine and muscular debility, but in mine there is every provision made for steadying the bones upon each other, until all the parts have resumed their natural form and become strong in their natural relations.

Eighthly. Hossard's invention is not applicable in any case of excurvation of the spine, but my Patent Spine Support is not only applicable in the management of excurvation where there is no disease in the bones, but is also highly beneficial in many cases where disease has made considerable ravages, and where the spine has become much deformed in consequence, as will be sufficiently evident from the cases reported in the last Section.

I would remark further that in most cases the chest has become deformed more or less in consequence of the deformity of the spine, and in many of them the reduction of the curvature of the spine will not be attended with a restoration of the natural form of the chest. In Hossard's treatment there is no provision made to meet these evils; but by the use of my apparatus they are met, and often overcome.

In Hossard's treatment I have not been able to discover any provision calculated to assist in restoring the natural figure and at the same time to give strength to the muscles generally, and especially to the muscles of the spine, except so far as the muscles may be brought into operation to restore the equilibrium of the body. I have provided for this in my Patent Exercising Plane, which is made to operate with my Patent Spine Support and with the hand of the surgeon in reducing the curvatures of the spine, and at the same time in giving tone to the muscles and in restoring their balance of power.

In short, Hossard and Tavernier appear to proceed wholly by the "Méthode d'Inclinaison," which is applicable to a limited number of cases in the recent stage. There are, however, very many cases in which this method would be worse than useless. My plan of treatment is upon a more extended scale, embracing not only a few easily managed cases, but almost all the cases of spinal deviation which I have noticed. In many of these the spine not only requires to be inclined to the right position, but to be gradually placed in the right position; not only to be placed in the right position, but to be kept in the right position; and for these purposes principles of action must be brought into play during the progress of the treatment that are utterly foreign to Hossard's contrivance, and cannot be accomplished by it.

In some cases, for instance, there are parts of the chest that require

to be lifted up so that there may be room to allow the vertebræ to return into their relative position upon each other, into which they are gradually guided by the hand of the surgeon. Some cases require the mechanical action to operate transversely to the long diameter of the body; in others the action must be partly oblique and partly transverse. At one time during the progress of the treatment, part of the superincumbent weight must be removed from the spinal column and transferred to the pelvis; at another, all the bones of the spine are made to bear their proper superincumbent weight. Some parts require the operation of gentle but steady pressure for their restoration, while others require all pressure to be removed; some to be enlarged, others to be diminished; some to be brought forward, others carried backward; some to be borne to the right, others to the left; some to be compressed, others to be expanded; some to be carried obliquely downwards, others obliquely upwards; some to be steadily retained in the position in which they are placed, others to be left at full liberty to move. The power of some is to be augmented, and that of others decreased; some parts must be increased in length, and others diminished in length; the action of some must be retarded, and that of others accelerated.

The principles upon which my Patent Spine Support is constructed, with its addenda, have respect to all these conditions of the affected parts; and if the judicious surgeon be practically acquainted with the powers of this apparatus, and be well versed in the knowledge of the many varieties of spinal curvature, and the varying conditions of the parts under treatment, the mechanism, when used in connexion with my Patent Exercising Plane, enables him to carry these principles into effect with a degree of safety and success which has never before been equalled at any period or in any place with which I am acquainted.

CHAPTER II.

Deformities and Contractions of the Chest.

Deformities and Contractions of the Chest arise as a consequence of Distortions of the Spine; also from Muscular Weakness, resulting from Sickness, or from Disease of some of the internal Organs of the Body, with or without a Rickety Condition of the system.

SECTION I.

Of Deformities of the Chest arising from Distortions of the Spine.

Section I.

Treatment.

In order to remove deformities of the chest occasioned by deviation of the spinal column, it is necessary, either before or at the same time, to use such means as are calculated to diminish or remove the cause by which they are produced. For this purpose I employ the means recommended in the sections of the last Chapter. These are assisted materially by the action of the muscles of the chest, which, as soon as the condition of the spine will allow, should be brought into full play, being freed from all mechanical constraint; in some cases the muscles are required to be controlled, for a time, so far as may be necessary to prevent them injuring the spine or causing undue development of any portion of the chest.

State of chest.

In cases of deformity of the chest arising from lateral curvature of the spine, one side is enlarged, and, as I have said, moves too extensively, while the other side is contracted and is almost quiescent. Now, in order to make the two sides of the chest act

equally, it is expedient to restrain one in a measure by mechanical appliances, while every means should be employed in season, consistently with the nature of the case, to increase the movement of the other. While the spine is being brought up to its proper position, and the vertebræ are being restored to their natural relative bearings, and means are taken to restore the ribs to their natural distances from each other, little can be done for the purpose of enlarging and equalising the capacity of the chest beyond the effect produced by increased efforts in respiration under the operation of mechanical constraint. In these cases the restoration of the bones to their natural positions is necessary to the restoration of the figure, and must in many cases precede in a great degree the due enlargement of the capacity of the chest.

The two sides move unequally.

In these cases the ribs are crowded together more or less in certain parts and evidently separated in others, according to the position and depth of the curves; and hence it happens that the chest, being in some parts preternaturally developed and in others contracted, is often unequally enlarged in capacity in its transverse and diminished in its long diameter.

Capacity.

The form of the chest, however, alters under the treatment which I have recommended for spinal curvature; its dimensions are, on the contrary, increased in the long diameter and diminished in the transverse. This takes place in part as the necessary consequence of raising the spine and bringing it to its proper length, and in part by the operation of the measures used for the reduction of the curvatures, which act upon the spine in some measure through the medium of the ribs. The apparent contraction of the chest arising from its diminished circumference frequently leads to the belief that its capacity is actullay diminished, when in truth the difference may only be an alteration in form, whereby it approaches nearer to the natural figure; its capacity being now properly increased in its long diameter and con-

The form altered by treatment. Capacity not diminished.

SECTION I.

tracted in its transverse. This may be illustrated by an easy experiment:—Half a pint of water placed in a quart decanter will occupy a space in the decanter one inch and a quarter deep, but half a pint of water in a pint decanter will fill a space two inches and a quarter deep. In this case there is no difference in the quantity of the fluid; the difference is simply in the form of the vessel. The transverse diameter of the vessel being greater in the quart decanter than in the pint, the depth of the fluid is less; and its depth is increased in proportion as the transverse diameter of the vessel is diminished, though the quantity of the fluid contained in the vessels may be precisely similar in both cases. So, in like manner, the quantity of air inhaled at each inspiration may be the same in the chest enlarged by deformity in its transverse and diminished in its long diameter as is found to be inhaled when the chest is enlarged by treatment in its long diameter and diminished in its transverse, which takes place in most cases during the progress of restoration, and that in a measure commensurate with the degree of deformity and the degree of restoration effected. For instance, if a person with a dorsal curvature be raised by the reduction of the curves one inch, the alteration in the figure of the capacity of the chest will take place in a corresponding degree. If he be raised six inches, the figure of the chest will be altered in an equal proportion; its capacity being relatively diminished in the transverse and increased in the long diameter, which would produce an apparent contraction of the chest, though its actual capacity continues in fact the same.

To be remembered.

The alteration in the figure of the chest which takes place as a consequence of the deforming process should be borne in mind, and likewise the alteration produced in its figure by the effects of the treatment which I am accustomed to recommend. In the one case the natural form of the chest gradually gives way to the influence of the deforming process, and is thereby sometimes enlarged in its circumference, and in the other this process is overcome, and the chest

is gradually restored to its natural figure and consequent capacity and functions.

Erroneous inference.

From want of knowledge upon this subject, surgeons and others have suffered themselves to be carried away by groundless apprehension. They have seen the alteration in the figure of the chest in persons under treatment for lateral curvature; they have seen its circumference diminished, and they have supposed the chest was suffering from the means employed; whereas this was nothing more than the necessary change which takes place in the progress of the treatment adopted for bringing the bones into their natural relations, and for the restoration of the symmetry of the body.

Injury may arise from improper management.

I am far from stating that my Patent Spine Support may not be used in spinal cases in such a manner as to do mischief to the chest; but this is no argument against its right application and management. What has God given to man that he has not abused by accident, ignorance, or design, and made to produce evil instead of good? If we shut ourselves up from the use of all visible things that can be abused, we should soon close our existence in this life. Improper application and improper management of the means which I employ in the treatment of spinal distortion may occasion unnatural contraction of the chest. If the curvatures be very firmly fixed and time be not allowed for their gradual reduction, the chest may suffer; so in other cases of a more simple nature, if the treatment be hurried or improperly conducted, mischief may ensue as a consequence: but let the means which I recommend be judiciously employed according to my views, and the results will appear to be in every way gratifying to the surgeon, the patient, and his friends.

Shampooing, &c.

After the spine is brought up to its natural line, or restored as far as the condition of the parts and other circumstances will permit, shampooing and friction should be had recourse to, and the patient should be directed to expand the chest freely as he lies upon his

SECTION I.

back with the chest thrown somewhat forward by means of a pillow placed under the shoulders. The free action of the chest will in this way be restored and its capacity greatly increased in the course of a few weeks.

Very bad cases.

In some cases the chest has become so much contracted in consequence of long-continued and extensive deformity of the spine that little beneficial effect can be produced upon the deformed parts by treatment. In some instances the deforming process has proceeded so far, and the health is so much injured by it, that it is useless to attempt to do more than prevent the deformity from increasing, and to alleviate the sufferings of the patient, by careful attention to mechanical support, medicinal management, exercise, and diet. Sometimes this fearful condition takes place very rapidly, as in Case 33.

SECTION II.

Deformity of the Chest from Muscular Weakness accompanied with or arising from internal Disease or Disorder, and with or without a Rickety Condition of the system.

Period of life.

DEFORMITY of the chest, arising from weakness of the muscles, commonly takes place during teething, but may be produced by any complaint that tends to debilitate the system. This distortion usually

Usual form of the chest.

assumes the form called "chicken-breast." In this variety of deformity the chest is usually more or less contracted laterally, the sternum is thrust forward, and the abdomen is preternaturally enlarged, sometimes to the extent seen in Plate XXVIII., Figure 59.

Functions impaired

The intercostal muscles act very little in respiration, the breathing being principally abdominal. In many cases it is short and difficult. This takes place in a degree proportionate to the weakness of the system and the extent of the deformity.

Medical Treatment often inadequate.

Medical treatment and nourishing diet are commonly necessary in these cases, and when they are very slight persons may recover slowly by these means, with little defect in the configuration of the chest; but when the deformity has made considerable advancement, medical treatment, with good nourishment and care, are insufficient to check the deforming process, and restore the natural form of the chest.

Author's Treatment, mechanical and medical.

In addition to these means, friction of the chest and shampooing are also very beneficial. Mechanical support should likewise be judiciously given to the parts which require it. This, I find, is the most efficient part of the treatment. I use, in these cases, my Patent Body Support, and find it powerfully restorative. It should be applied so as to sustain the abdomen effectually, and gradually reduce it to its proper size. The chest should not be borne upon by the Support; on the contrary, it should be left at full liberty, and the muscles should be stimulated to act with proper energy by shampooing and friction carefully administered.

Effects upon the Muscles.

Under this treatment the patient is constrained to use the muscles of the chest, which he should be brought to do gradually, by closing the abdominal portion of the Support from time to time, as he is able to bear it.

Progress in bad Cases.

In very bad cases children usually die, the ordinary treatment being insufficient for their relief, and when submitted to the treatment which I recommend, some months elapse before the chest is restored to its natural figure and the abdomen reduced to its proper dimensions. During this time the state of the respiration is but little altered. This arises from the fact, that as the chest becomes enlarged the abdomen is diminished in size by the operation of the Support, until both be restored to their natural figure, and when this has taken place the function of breathing becomes perfectly natural.

Careful management necessary.

Care should be taken during the treatment not to hurry the restorative process out of its due course, or more rapidly than is consistent

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with the strength of the patient. Should this caution be neglected, the patient might be greatly distressed and even destroyed by the very means which, judiciously managed, would gradually accomplish his perfect restoration.

Contractions commence in Childhood.

Contractions of the chest, as they occur independent of curvature of the spine, are common in childhood, and are at this period, for the most part, very readily removed. They are, however, often overlooked until they have made considerable progress. In the slighter cases of this description, accompanied with unnatural fulness of the abdomen, the tumefaction of the abdomen ultimately subsides under the ordinary medical treatment; but if efficient means be not resorted to for the purpose of removing the contraction and favouring the natural development, the deformity of the chest will, in most instances, continue more or less, and will be in after life a common cause of a weakly and sickly condition of the body.

May remain during Life.

As seen in Adults.

Simple contractions of the chest and deformities of the ribs, as they are observed in adults, have their beginnings usually in early childhood; and it will frequently be found that the malformation of the ribs, seen in persons who have arrived to the adult age, are merely the remains of the deformity which took place at an earlier period of life, and which the powers of the constitution could not afterwards entirely remove.

Treatment in Adults.

Much good may be effected in these cases after the period of growth by the use of my Patent Body Support, accompanied with friction, shampooing, appropriate exercises, and occasionally well-regulated pressure; but the amendment is comparatively slow, and perfect restoration is not always accomplished.

Contractions from destructive Disease in the Lungs not curable.

Partial contractions of the chest arising from disease in the lungs, going on to the extent of destroying their functions on one side, wholly or in part, cannot be removed by any means with which I am acquainted.

CASE 48.

PLATES XXVIII and XXXI.—Figures 59 and 67 *Represent a front view of the Body and Limbs of a Child, as he was when the Author was first consulted.*

James Soper, æt. 5, was brought to me, with his body and limbs deformed in the manner represented in Figures 59 and 67. His health became bad when he was about two years and a half old, and he was consequently placed under the care of a physician, who continued to prescribe for him, from time to time, for about twelve months. During this period the child's maladies continued to increase. He grew weaker, and at length, was unable to stand. The chest, which had been open and full, gradually contracted at the sides, and the abdomen became very large. The leg and thigh bones lost their natural figure. When he was brought to me, they were bent, and enlarged at the extremities. The bones of the arms also presented a rickety appearance. The ligaments were elongated, and the joints had given way. His respiration was very difficult, and he was unable to retain food upon his stomach. His bowels were always much relaxed, and the secretions were unhealthy. When I was consulted, he was much emaciated, and was in every respect daily getting worse.

I ordered for this child one of my Patent Supports for the body, and also my Leg Supports for the lower extremities, which he has continued to wear for about twelve months, seeing me occasionally. From the time they were first applied, his health began to improve. He was soon able to retain his food, the purging gradually left him, and has now entirely ceased. The enlargement of the abdomen has yielded to the operation of the Support for the body, and the chest is considerably expanded. The lower extremities are approaching to their natural form. The child's health and form are in every way greatly

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altered for the better; he is much stouter; his strength is considerably increased, and he is now again nearly able to walk alone.

During the time this child has been wearing the Supports he has not taken any medicine, except an occasional dose of magnesia.

CASE 49.

PLATE XXVIII.—Figure 60 *Represents the improved state of a Child whose Chest and Abdomen were considered to be more deformed than the Chest and Abdomen of the Child shown Figure* 59. *The Spine had also begun to give way posteriorly.*

Miss ———, æt. two. I was consulted respecting this child at the end of June, 1838, in consequence of the state of deformity and weakness under which she was labouring.

Upon examining her, I found a deviation of the spine backward, which involved the lower dorsal vertebræ. The abdomen was very prominent, and the chest projected forwards, and was spread out at the lower edges over the abdomen, and was much flattened at the sides, as in Figure 59. The respiration was short, difficult, and rattling; she was weak and delicate, being unable to sustain herself in the sitting posture.

This child was born strong and healthy, and continued so until she was about nine months old. At this period it was supposed she had suffered from a fall, as she could not for several days bear to be moved without distress, and for some weeks she manifested herself to be in pain when her attendants were dressing her. The body fell away greatly, so that she was at last reduced to a state of great emaciation: as she grew worse the abdomen enlarged, and the chest contracted, laterally projecting at the lower part over the tumefied abdomen.

She was kept as much as possible upon her back, and medical means were had recourse to, under the direction of the family surgeon, but for a considerable period without relief from her sufferings. She was so reduced, and continued so very ill, that it was not supposed she would live: she seemed not to breathe by the action of the muscles of the chest, but by the movements of the muscles of the abdomen and the diaphragm. About the beginning of April, 1838, she began to rally, and gained a little strength. As soon as she was sufficiently strong to give hope of restoration, she was brought to town and placed under my care.

I applied one of my Patent Supports, so that it was made to sustain and gently compress the abdomen, and also to operate upon the projection in the back, taking care to leave the chest room to move freely. I ordered nourishing diet, and such medicines, from time to time, as were likely to be serviceable. I also manipulated the chest daily; improvement in her condition was speedily manifested from the use of these means. She gained strength rapidly, and was soon able to walk. Her appetite was good, and sleep tranquil. At the expiration of four months the abdomen was reduced to its proper size, and the chest had become expanded laterally; the deformity of the ribs was nearly removed, and the back had acquired its natural figure.

She was now sufficiently recovered to return to the country. Her father took her from London, with directions to let me see her again at the end of about six weeks. When he brought her to town the second time he kindly permitted me to take a drawing of her person. Her appearance at that time is represented in Figure 60. By comparing this Figure with Figure 59, the degree of improvement which had taken place in the chest and abdomen of this child will be very manifest; the body having presented an appearance very similar to that of the child Soper, shown in this figure.

CASE 50.

Master Todd, æt. one year and a half. When I was consulted for this child, he was suffering from a lateral contraction of the chest, tumefied abdomen, and a slight posterior curvature. The child was very weak, pale, and greatly emaciated, so that under ordinary circumstances he could not have been expected to live. The appearance of the chest and abdomen was very similar to the appearance of the same parts in Miss ——— case 49, and as in the child Soper, represented in Figure 59. His breathing was abdominal, short, hurried, and rattling.

This child was born healthy, and continued so until he was about one year old: at that time he had the measles, from which he suffered severely. The abdomen now began to enlarge, and the chest to contract laterally. He wasted gradually, and the deformity of the chest and abdomen continued to increase, overcoming all the medical means had recourse to for his relief, until he was brought to me.

I ordered for him one of my Patent Body Supports, and regulated its action, from time to time, as he was able to bear it, as in the last case, and prescribed some powders containing a small quantity of Hyd: c. Creta. The amendment in his condition soon became manifest. He gradually recovered his health and strength, and at the end of six months he was in every respect greatly improved. He had now become strong, and appeared florid and healthy: the size of his abdomen was nearly natural, and his chest was very much expanded; when the Support was taken off, I observed that the respiration was principally abdominal, but when it was applied, the chest was fully expanded by each inspiration. The muscles of the chest had not fully recovered their natural energy, consequently he still laboured in breathing. He had also a chronic bronchial affection, which occasioned a rattle in respiration. These evils were not sufficient to occasion any bodily distress,

and it is probable that by the use of the same means they will in a short time be entirely removed. SECTION II.

These three cases which I have chosen to relate are of the very worst description of the kind that have fallen under my observation. Cases of a similar nature, but much less severe, are very common. They are frequently connected with, and perhaps are, in a great measure, the cause of various other maladies; as distortion of the knees and ankles, yielding of the bones, and enlargement of the wrists, elbows, knees, and ankles; enlargement of the head, watery effusions, and many other complaints which accompany imperfect assimilation and insufficient airation of the blood. Remarks.

In the early stage of contractions of the chest, and abdominal enlargement, in children, I have recourse to the careful employment of the means which I have recommended, viz., my Patent Body Support, paying at the same time due regard to friction, shampooing, diet, and occasional medical management. By these means, I believe, it will be found that persons so afflicted are delivered during childhood, and in after life, from much pain and bodily distress; and parents and friends from the anxiety and care which arise from the long list of disorders and diseases which often accompany, or are, sooner or later, consequent upon, contractions of the chest and tumefied abdomen, when they are neglected in childhood, and afterwards left to the unaided powers of the constitution, weakened by the existence of deformity, disorder, and disease.

CHAPTER III.

Of Weakness, Deformity, Stiffness, and Contraction of the Limbs.

SECTION I.

Of Weakness of the Knee and Ankle Joints, and of the Arch of the Foot, with or without Deformity of the Bones.

Very common.

These are very common complaints; they commence usually in childhood, in consequence of some weakness of the system, arising from disorder or internal disease. They frequently accompany contractions of the chest and enlargement of the abdomen.

Local cause.

Before the joints give way it appears to me that some one or more of the muscles lose their due antagonising force. When this has happened there results an undue bearing upon some of the ligaments, which are thereby stretched and ultimately elongated. The bones then gradually lose their proper relative position, and the consequence is some kind of deformity.

Weakness from relaxation.

Sometimes the ligaments become elongated without any previous want of energy in the muscles. When this has proceeded so far as to be regarded as a complaint, it is accompanied with weakness and instability of the parts, which may exist to a considerable degree without the production of deformity.

Deformity of the bones.

Deformity of the lower limbs is frequently produced by a yielding of the long bones, which, in such cases, are too weak to bear the superincumbent weight of the body. This condition of the bones may exist with or without yielding of the joints.

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Names of these Distortions.

These maladies are variously named, according to the parts in which they exist. Thus we have *In-knee*, or that deformity which consists in the yielding of the limb at the knee-joint, so that the limb becomes bent unnaturally inward, as in Plate XXIX., Figure 61. *Out-knee* is that deformity in which the limb is bowed outward, as in Plate XXX., Figure 63. *In-ankle* is a projection of the ankle-joint inwards, Plate XXXII., Figure 69. In the deformity called *Out-ankle* the joint projects outwards, Plate XXXII., Figure 68. *Flat-foot* is a deformity in which the arch of the foot is lost, or greatly diminished. This is often accompanied with inversion of the ankle-joint, as in Plate XXXII., Figures 71 and 72. *Bowed-thigh*, where the thigh-bone is bent out of its natural line, Plate XXXI., Figure 67. This is frequently accompanied with *Bent-leg*, as in Figure 67, where the deformity is seen in a rickety child, in whom the bones of the leg have yielded to the weight of the body, and have become bent. The ligaments of the knees, ankles, and feet have also given way. Figure 65 shows the bones of the leg bent, the ankles turned outward, and the arches of the feet nearly lost. Figure 66 represents a case of flat-foot with a bent state of the leg-bones without eversion of the knees.

Sometimes these conditions of the joints and bones are accompanied with enlargement of the ends of the bones, producing preternatural fulness of the wrists, the knees, and ankles, as in Figure 67. This state of the parts is commonly called rickets.

Differ in degree.

Deformities arising from yielding of the joints and of the bones are found to exist in different degrees of severity, and also are frequently more or less complicated with one another, and consequently require some modification in the treatment suited to the special circumstances of each case.

Treatment.

I have found that mechanical support is a chief part of the treatment in all these cases; but if the various supports employed be

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inadequate, or improperly used, they will be productive of little profit to the patients, and are found often deceptive and positively injurious.

Principles.

The principles of treatment is to bring the distorted parts into their natural relative positions, and sustain them there while the body is being strengthened, and until the parts themselves are sufficiently recovered to bear the superincumbent weight with safety.

Usual Supports inadequate.

I have not found any of the common apparatus answer my purpose in these cases; I have therefore had occasion to introduce new.

Author's Leg-Support.

My Leg Support, made suitable to the case, and modified in its application, produces the desired effect in cases of weakness of the knee and ankle-joints, with or without yielding of the long-bones. Where the arches of the feet have given way, I employ also false arches, introduced into the boots, to sustain them. These means require to be regulated from time to time, according as the parts under treatment approach to their natural relative bearings upon each other. The apparatus should be, at first, so applied, as to take off part of the weight of the body from the limbs. This favours the reduction and restoration of the bones.

General Treatment.

In all cases of this description, the body should be well nourished. Medicines should be given suitable to the condition of the system, and active exercise should be prescribed. In some cases friction may be employed, locally, with advantage. This, however, should be done in such a manner as to assist in giving tone to the weak muscles, and not to interfere with the restoration of the bones and ligaments.

In the recent Stage easily removed.

In the recent stage, deformities arising from yielding of the joints are easily and speedily removed; but in the more advanced stage, when the bones have become altered in shape, more time and care are required for the restoration of the parts.

Of In-knee.

Of all the deformities I have mentioned in this section, occurring in one or both limbs, in-knee is one of the most frequent. It exists in various degrees of severity, and is very frequently accompanied with yielding of the arches of the feet, and inversion of the ankle-joint, as in Plate XXIX., Figure 61.

Slight cases sometimes cured without Supports.

In very slight cases, when the constitution is strong and the health is good, a cure may be sometimes effected by friction, shampooing, generous diet and country air, without mechanical aid. But the process of restoration is very slow when support is not had recourse to; and as the Supports which I employ are neither irksome nor injurious, I think it advisable to recommend them even in slight cases, for the more speedy restoration of the parts.

Time required to reduce the bones.

When the limbs in young children are extensively deformed, as seen in this Figure, with much relaxation, and without any considerable alteration in the figure of the bones, they may commonly be restored, by the operation of my Leg and Foot Supports, to the state seen in Figure 62, in less than a fortnight. In cases in which the inversion is less extensive, the restoration of the parts to their natural positions may be effected in a week, and in some instances, still less severe, it may be accomplished at the time when the apparatus is first applied.

After reduction.

After the parts are restored, the surgeon should superintend the operation of the apparatus, and regulate it to suit the length and size of the limb. For some time before the Supports are removed, they should be used simply to guard the limbs from deviation, and not in such a manner as to remove from them the superincumbent weight of the body. This should be thrown upon them gradually, as they are able to bear it, after the bones are restored to their proper form and positions, until they are able to sustain the whole weight without injury to, or any unnatural yielding of the parts, and then their perfect restoration may be regarded as accomplished.

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The use of the Supports to be continued—how long?

The time during which it is necessary to continue the use of the Supports, after the bones are reduced to their natural position, differs in different cases; the length of the period depending, in a great measure, upon the extent to which the deformity has arrived, and the time of its duration, before the treatment was commenced, and upon the state of the health, the age of the patient, and other circumstances. Commonly, however, in children in whom the bones are not deformed, the Leg Supports may be removed with safety in periods varying from twelve to twenty-four months. Where the long bones are deformed, a longer period is usually required. In adults the same degree of deformity requires a longer period for its removal than in children; and in them more time is also necessary for strengthening the parts after the reduction is effected.

The following cases will suffice by way of illustration :—

CASE 51.

Master White, æt. five, was brought to me from Colchester, in September, 1838, with inversion of the knees, in-ankles and flat-feet. The child was strong and healthy when born, but when he was about two months old he had an attack of influenza, from which he suffered severely. After this he continued weak, so much so, that he did not begin to walk until he was about two years old. Soon after this period, it was observed that the ankles were giving way, and in the course of a short time the knees also yielded to the superincumbent weight.

I applied my Leg and Foot Supports, and he was left in town under my care. The child being very delicate and remarkably timid, it was needful to proceed with the restorative process by very gentle and slow degrees. In the course of a short time, however, the limbs were straightened and the parts sustained in their natural positions, by the operation of the Supports. I sent him home in

about five weeks, desiring his father to bring him to me again at the expiration of six weeks after his departure. I have seen him occasionally since; he wore the Leg Supports about eighteen months; I then desired that they should be discontinued, the limbs being firmly retained in their natural positions when he stood without them.

CASE 52.

PLATE XXIX.—Figure 61 *Shows the degree of Deformity when I first saw the case.*

62 *Represents the child as he stood in the Leg and Foot Supports, two days after their first application.*

Master P——, æt. seven, had his knees, ankles, and feet in the condition seen in Figure 61. The arches of the feet first gave way, and consequently the ankles became inverted. About two years after the deforming process was observed in the feet it became manifest in the knees, which began to turn inwards. He had been a delicate and sickly child before the deformity commenced.

He wore, for some time, the common apparatus, supplied by one of the most approved mechanists in London, but without relief; and as he was considerably distressed by them, they were discontinued.

When I was consulted, the distance between the inner edges of the soles of the feet as he stood with his knees together, was eight inches. I applied my Leg and Foot Supports as for the removal of deformity of the feet, ankles, and knees. The arches of the feet were immediately restored, and the knees were so far reduced to their proper position that the distance between the inner edges of the soles of the feet was now not more than two inches, These effects were produced without pain,

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and in a manner insensible to himself. I saw him again two days after, and found that he had passed the interval comfortably. I at this time regulated the Supports again, and was able, without difficulty, and without giving the child pain, to bring the ankles together, and to retain them in their natural position, in this manner, by the operation of the Supports, as seen in Figure 62.

In this case the strengthening process goes on slowly. He has worn the Supports two years and six months, and they cannot yet be left off with safety. The Supports will guard the limbs from deviation until they become strong. He is able to run with his hoop, wearing the Supports, and play with impunity as he chooses. *

CASE 53.

Miss Green, æt. three years and a half, had in-knee on the left side, which commenced soon after she began to walk. The distance between the ankles, as she stood with her knees together, was about four inches. The right knee was very slightly inverted; the difference from the natural line on this side was so trifling, that, under ordinary circumstances, it would not probably have been noticed. The child is constitutionally delicate, but she has usually enjoyed a good share of health.

I recommended my Leg Support for the *left side only*, being willing to see whether the other limb would recover from the slight deviation which had taken place in it without artificial aid. The left limb was soon brought up to the natural position. After this was accomplished, she continued to wear the Support for the purpose of maintaining the

* From peculiar circumstances a deviation from my usual mode of management has been required in this case, which I have no doubt has much retarded the restorative process.—*Author.*

bones in their proper bearings upon each other, about twelve months, during which I saw her occasionally. At the expiration of this time, the *left* limb, which had been so much turned inward, was straight and strong, not yielding unnaturally to the superincumbent weight; the *right knee*, however, was no better, but, on the contrary, had become rather worse than it was when I was first consulted. I now recommended the use of my Leg Support for the right knee, and directed the parents to continue the Support as a guard for the left. She has worn the Support on the right side about six months, and this limb is now also restored to its natural line. The limbs are able to sustain the superincumbent weight of the body without yielding. She stands without artificial aid, with her knees and ankles together.

Remark.

This is an example illustrative of the advantage derivable from the use of the Supports, even in cases where the deviation is slight; and of the rapidity with which the parts recover when the Supports are had recourse to at an early stage of this complaint.

Bow-knee.

Nature of.

Bow-knee, or eversion of the limb at the knee-joint, occurs far less frequently than in-knee. In-knee is a very common complaint, whereas bow-knee or out-knee is comparatively rare. Sometimes only one knee is affected. Occasionally one knee is thrown inward and the other outward. It now and then happens, when the deformity has arrived only to a slight degree, and the strength of the system restored, the natural position of the limbs is recovered without mechanical aid; but daily experience shows that it is not safe to leave such cases to the powers of the constitution without competent medical authority.

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Treatment.

I use in these cases my Leg Support, by which I am enabled to restore the parts to their natural relative bearings upon one another.

CASE 54.

PLATE XXX.—Figure 63 *Shows the state of the Limbs when the Author was Consulted.*

„ 64 *Shows the effect of Treatment in Nine Months.*

Miss ———, æt. fourteen. This lady was brought to me in consequence of deviation of the spine and deformity of the lower limbs. The limbs were bent in the manner seen in Figure 63. Miss ——— was born a healthy child, and when she was eleven months old she could run alone. About this time she suffered from mesenteric disease, and became weak and unable to stand; after this she was not allowed to bear upon her feet until she was five years old. At the end of that period she was much recovered in strength by country air, sea-bathing, &c. Her legs were in their natural position, but her wrists were enlarged. When she was six years old her knee-joint gave way inwardly, especially the right, for the relief of which she wore an apparatus extending to the armpits, for about six years and a half. When she was about twelve years and a half old her legs were restored to their proper position. Part of the apparatus was now removed, and at the end of another year the whole was discontinued. Soon after this the limbs began to bend outward at the knees, particularly the left, and the spine became curved. Apparatus was again applied to the limbs, and worn for about twelve months before I saw her, but with little benefit, except in this respect, they enabled her to walk with less fatigue. The curvature of the spine increased until she was placed under my care in June, 1838.

When I was consulted, her health was delicate, and her counte-

nance manifested the existence of bodily distress. The limbs were thin and bowed outward, producing a separation between the knees, as she stood with her feet together, amounting to five inches and a quarter. The limbs were firmly retained in this position as she stood, and the arches of the feet were nearly lost; the ends of the long bones were enlarged, the thigh-bones bent forward, and the spine was curved, but the curvature had not passed into the second stage. (See Case V., page 37.)

For the restoration of her limbs she wore my Leg Supports, which were modified to suit her case; she also used my Exercising Plane, for the purpose of strengthening the limbs as well as the back.

Through these means she was soon benefited; the spine was restored in about four months as I have stated, as seen in Figure 1. The limbs were brought up, in the manner seen in Figure 64, in nine months. Her health was perfectly re-established; she was quite altered in her appearance; she had become strong, and her limbs were full and muscular, as seen in this Figure. She could now stand with her knees together without support of any kind, but the ligaments of the knee joints had not sufficiently recovered their natural length and tenacity to enable her to leave off the Supports with impunity.

As she was sufficiently recovered to leave the Establishment, I now recommended her return to her father's in the country.

CASE 55.

Weak Knee-joint from relaxation, without Deformity.

The following case shows the advantage of my Leg Support, when used for weakness of the knee-joint arising from elongation of the ligaments without deformity.

Mr. ——— came to me when about twenty years old, labouring

SECTION I.

under weakness of the knee-joints to such an extent that he had great difficulty in walking. The condyles of the thigh-bones moved so much upon the tibia when the limbs were in the straight position that he felt himself insecure upon his limbs, and his walk was fatiguing and awkward. This gentleman is of the middle stature, but rather thin; his constitution is not robust, but his health was generally good.

I applied my Leg Supports to the limbs, and with them prevented in a great measure the movement of the thigh-bones upon the bones of the legs when he was walking. He gradually acquired strength in the knees. The ligaments became adapted to answer their natural purposes, so that in the course of a few months he was able to leave off the Supports and walk without difficulty.

Weakness in the Knees from loss of Balance of Power in the Muscles.

Nature.

Sometimes weakness of the knee arises from a loss of the balance of power in the muscles of the limb, so that the person affected stands with the knee of the weak limb somewhat bent forward: not unfrequently the weakness in the extensor muscles is so great in both limbs that the person cannot stand without assistance.

Treatment.

In these cases I recommend friction, shampooing, and a course of exercises so directed as to bring the weak muscles into action. While the muscles are recovering their tone I employ my Leg Support, by the use of which my patients so affected are greatly relieved, and are able to walk without other assistance; provided they have strength sufficient to move the limb freely backward and forward, and to steady themselves upon their feet. If the parts be too weak for this purpose they have recourse also to the use of crutches. This treatment is followed as long as may be necessary either for relief or cure.

In-Ankle.

PLATE XXXII.—Figure 69.

This is a complaint which sometimes arises from simple elongation of the ligaments of the ankle-joint, but is more frequently the result of the loss of the balance of power in the muscles and diminution or loss of the arches of the feet, as in Figure 72. Nature.

When the deformity arises from simple relaxation of the ligaments I employ my Ankle Support, which is so constructed as to give effectual and comfortable support to the weak parts when the weight of the body is thrown upon the limbs, as in standing or walking, until the ligaments are restored. The patient should wear laced boots, or have a bandage carefully applied round the joint. Treatment.

If the muscles have lost their balance of power, friction, shampooing, and well-directed exercises should be had recourse to, in connexion with the use of the Ankle Support.

Should these conditions of the limb be accompanied with weakness of the muscles of the soles of the feet, elongation of the ligaments, and consequent loss of the arches, the means proper for the removal of these defects should be likewise employed.

Out-Ankle.

PLATE XXXII.—Figure 68.

This deformity consists of eversion of the ankle-joint, which exists in different degrees of severity, and usually arises from a loss of the balance of power in the muscles which operate upon the foot. In these cases the peronei muscles are commonly in fault. Nature and cause.

I use friction and shampooing, and appropriate exercises for the restoration of the muscles; and while this is being accomplished I employ my Ankle Support, which prevents the ankle from yielding Treatment.

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during progression, and operates in such a manner as to draw the bones gradually over to their proper bearings upon one another.

These means are continued as long as may be necessary for the relief of the patient. Sometimes the bones are restored at once, so that the limb is brought up to its natural figure by the first application of the Support. At others a considerable period is necessary to accomplish this purpose.

Time in curing.

The time required to effect a perfect restoration in these cases depends upon the degree of displacement, the period of its duration, the age of the patient, the condition of the affected parts, and other circumstances by which the cure may be facilitated or retarded.

Flat-Foot.

PLATE XXXII.—Figure 71 *Flat-Foot.*

„ 72 *Flat-Foot and In-Ankle.*

„ 73 *Shows the Foot in the Natural State.*

Nature not mentioned by authors.

This deformity is in different degrees very common. I am not aware that it has been described by any author with which I am acquainted, nor have I heard it mentioned by any of those whose surgical lectures I have attended. It is, however, a complaint of frequent occurrence, and when it is extensive the feet are much deformed, and persons manifest considerable awkwardness in walking, and often experience much weakness and pain in the feet after moderate exercise in the erect position.

Occurs at various periods of life.

This malady is usually manifested first in childhood, but may occur at any period of life. It is frequently accompanied with inversion of the ankle-joint, as in Figure 72. Occasionally, the natural spring of the feet being lost, the person ultimately walks with the front parts unusually everted, and the inner edges turned forward; and evinces considerable caution in progression, arising from the sensation of weakness and pain experienced in the feet.

Cause.

This deformity arises from elongation of the ligaments by which the bones which form the arches of the feet are held together. This condition of the ligaments is commonly preceded by, and usually accompanied with, weakness of the muscles situated under the bones of the feet. Persons do not recover from this state of the parts without artificial assistance.

Treatment.

I employ my Foot Supports in these cases. When the ankles are not inverted these Supports are sufficient. They are placed in the boots and shoes worn by the person, and in use are not visible. By them, in recent cases, I am able to bring the feet into their natural position at once, without pain or inconvenience. When the bones of the feet have become relatively fixed in their unnatural state, a longer period is necessary for this purpose; and after it is accomplished a considerable time must be suffered to elapse in order that the parts may be sufficiently strengthened to bear the superincumbent weight with safety, when the Supports are removed. When the muscles placed under the bones of the feet are defective in energy, strengthening measures are had recourse to, as shampooing, friction, and regulated exercises.

If the ankles are inverted I use, in addition, my Ankle Support, by which the ankle-joints are supported, and the bones are retained in their natural positions.

Time required for cure.

The time necessary to accomplish a cure in these cases differs considerably, and will be found to depend upon the condition of health and strength of the patient, upon the energy of the restorative powers of the system and other circumstances. In young children various periods, from six months to twelve and upwards, are required: in adults the feet are usually brought to their natural form with more difficulty, and a longer period is necessary for the perfect restoration of the parts. The Supports should not be discontinued in any case as long as the arches of the feet yield unnaturally, when the weight of the body is thrown upon them.

When the Supports may be left off.

CASE 56.

Master ———, æt. thirteen, had lost the arches of the feet, and the ankle-joints were inverted in consequence. The deformity had existed some years. The parts had consequently acquired considerable firmness in this condition.

I applied my Supports in a manner suited to the state of the feet, and manipulated the parts from time to time, until the arches were restored: friction and shampooing were also employed. When the arches of the feet were brought up he returned into the country, with directions to continue the use of the Supports, and also to have the feet rubbed and shampooed daily, for the purpose of increasing the strength of the muscles. Some months after this I received a letter from his father containing the following report: "Six weeks have nearly expired since my son commenced leaving off the Supports, which he has done by degrees as you directed. At present he takes nearly his usual exercise in shoes without Supports of any kind, and I have the satisfaction to inform you that he has not experienced any fatigue in the muscles of the arches of the feet, and we perceive little or no difference in the position of the ankle-bones, when he stands up in his common shoes without Supports. Five casts of the soles of his feet have been taken at different times; and, though the arches have dropped a little as you expected, yet the difference between the cast which was taken when he began to leave off the Supports and the last cast that was made is only about the seventh part of an inch, and perhaps that may arise in some measure from the further development of the muscles of the arches from rubbing; we therefore flatter ourselves that we need not apprehend any mischief will ensue from his leaving off the aids entirely in the course of the next week, but we propose to continue the friction for another fortnight, leaving it off also gradually."

Five years have elapsed since the receipt of the letter containing

the above communication, and I am not aware that there has been any return of the deformity. SECTION I.

Deformity of the Long-Bones of the lower extremities, with or without Weakness of the Joints.

In almost all cases of deformity of the leg and thigh bones, in which they are unnaturally bent, there is more or less weakness of the joints of the knees, ankles, or feet. Sometimes all these joints have given way, as in Plate XXXI, Figure 67; sometimes the ankle-joints and the arches of the feet have yielded, as in Figure 65. Occasionally the weakness is manifested only in the joints of the feet, which yield to the superincumbent weight, and the feet become flat, as in Figure 66. Nature.

The causes which give rise to yielding of the bodies of the long bones, and the enlargement of their ends, are the same as occasion relaxation, weakness, and yielding of the joints; namely, constitutional disturbance or internal disease. Causes.

Deformity of the bones of the extremities have their beginnings in childhood. When the deformity is very slight children sometimes get over it during the future growth of the body. It is, however, not prudent for parents to trust to their own judgment in cases of this kind, and the more especially as a long period is necessary to remove it after it has existed some years; and after the growth of the body has ceased I cannot at present say that the evil could be entirely removed. When it commences.

In the treatment of these cases I use the Leg Supports which I employ in cases of weakness and yielding of the joints, and where the deformity of the bones is further complicated by yielding of the knee-joints, ankles, or feet, or all these parts: the only difference in the treatment consists in causing the Supports to bear more of the super- Treatment.

SECTION I.

incumbent weight of the body when the person is standing or walking. Free exercise and nutritious diet are required in all these cases; sea-bathing and occasionally alterative and strengthening medicines assist materially in invigorating the system and in restoring the bones and joints.

SECTION II.

Deformities of the Extremities from deficiency of Development; or from a preternatural contracted Condition, and consequent Shortening, of some one or more of the Muscles, as they occur, either with or without Disease.

From malformation.

Of Deformities and Contractions as they occur in and round the Hip-joint.

Occasionally malformations of the hip-joint are congenital, sometimes the psoas and iliacus muscles have not attained their natural length, or have become shortened at a very early period without any appearance of disease. Cases have been met with where the head and neck of the femur were deficient. The cavity of the acetabulum is sometimes nearly obliterated; occasionally there is found merely a superficial depression or groove; most frequently the two parts are united by an intermediate ligament differing in form and length, but this is in some cases entirely wanting. In some cases the same appearances occur in both sides, in others differences are observed, though both may be deformed. Various malformations about the hip-joint have been described by Palleta, and more recently by M. Dupuytren. This subject is, however, still obscure; there having been hitherto but few anatomical inspections calculated to illustrate it.

From disease.

Deformities of the hip-joint are most commonly the result of disease in the joint, which frequently goes on to the extent of destroying the

head and neck of the thigh-bone. When this has taken place the trochanter is elevated and prominent, the tuberosity of the ischium is more than commonly exposed. In these cases the affected limb is shorter and smaller than the other. Sometimes it is bent upon the pelvis, as in Plate XXXIII, Figure 75. Sometimes the limb is also rotated inward and carried towards the opposite side of the body.

On both sides.

When this happens on both sides, the limbs cross each other, in which position they are retained by the adhesions which form in the diseased parts, and by the fixed contractions of the muscles which bend the thighs upon the body, especially the adductors and the iliacus and psoas muscles. After the diseased action has subsided, attempts are made to place the body in the erect position, and now the pelvis becomes tilted forward, and the spine becomes incurvated at the loins, producing that frightful state of deformity seen in Plate XXXV, Figures 78 and 79.

Union ligamentous.

When the deformity arises from disease, producing destruction of the head and neck of the femur, the femur, is not united to the pelvis by bone, but for the most part by very strong adhesions, which confine the trochanter upon the pelvis and allow the limb to move only in a very limited degree. The muscles also, in their contracted state, assist in keeping it in a confined position.

Treatment.

The treatment in these cases consists in carefully and gradually elongating the adhesions by which the trochanter major is confined to the pelvis, and at the same time to overcome the shortened condition of the contracted muscles. This purpose I accomplish principally by producing gentle extension of the limb in a direction opposite to that in which it is fixed. Passive motion must be produced in the part by the surgeon, and this must be followed by active motion by the patient, who should be required to move the limbs by the action of its proper muscles, as he reclines, or as he stands in the erect posture, steadying himself upon crutches. He may be sometimes assisted in

SECTION II.

this, by appending a weight to the knee. Friction and shampooing should also be had recourse to for the purpose of increasing the movements of the limb, and to assist in strengthening the muscles.

Effects.

By perseverance in this way ligamentous adhesions and the contractions of the muscles may in many cases be overcome, and the limb may be extended and strengthened, so as to enable the person ultimately to walk with a high-heeled shoe with little manifestation of lameness.

On both sides.

When the deformity and contractions are on both sides, as in Case 52, I employ a mechanical bed which I have had constructed for the purpose of aiding me in overcoming them. This might also be had recourse to with advantage, when the adhesions and contractions do not yield to the more ordinary measures which I have mentioned.

As soon as the adhesion and contraction are sufficiently restored by the means employed, to allow the limbs to be brought into the positions required in walking, though only in a limited degree, I furnish my patients with Leg Supports and crutches, by which they are enabled to practise walking long before the muscles have acquired strength to bear up the bones against the superincumbent weight of the body. These artificial props are afterwards removed by degrees according as the state of the limb will allow, until the patient is at last left to walk with a high-heeled shoe, to which an Ankle Support is sometimes added.

When the head and neck of thigh-bone is destroyed on both sides.

When the patient is deprived of the head and neck of the thigh-bone on both sides, the limbs are brought nearly to the same length. In these cases the surgeon has only to make up the difference in the length of the limbs, if necessary, and exercise the muscles until the patient has acquired strength sufficient to enable him to walk without artificial aid.

Difficulty of restoration increases with the extent and

When the diseased action occurs in early childhood, and many years are suffered to elapse after the disease has subsided before any attempt is made to overcome the adhesions and contractions, the

limb is greatly stunted in its growth, and greater difficulty is experienced in producing freedom of motion; and a long time is afterwards necessary for the restoration of the tone and functions of the muscles.

duration of the deformity.

Occasionally the knee-joint is attacked with disease during the progress of disease in the hip. It may be of the same description, and go on in the same manner as in other cases of diseased knee-joint where the hip is not diseased; when the knee-joint becomes fixed from this cause, the treatment must be conducted upon the same principles as in other cases where this joint only is affected.

The mode of proceeding will be illustrated by the following case, the history of which I shall give nearly in the words of the surgeon in attendance during the progress of the disease.

CASE 57.

Plate XXXIII., Figure 75. *Shows the Deformity when I first saw the Patient.*

„ 75, A, *Shows the Effect of Treatment.*

Master George Clarke, æt. thirteen, has been the subject of strumous disease of the right hip-joint, which commenced nine years ago. He was a delicate child, and his constitution suffered greatly under the discharge from several sinuses about the joint. A hospital surgeon in London saw him at an early period, and it was his opinion that he would not survive the attack. In the course of his confinement, inflammation of the synovial membrane of the knee-joint of the same side supervened. There was much consequent effusion into the capsule of this joint, which was followed by some partial displacement of the articulating surfaces of the bones entering into its composition. The leg became bent upon the thigh, from the contraction of the flexor

SECTION II.

muscles, and now forms with the thigh nearly a right angle. There has been no openings leading into the knee-joint, and I imagine the cartilages have not materially suffered. A small degree of movement in the line of flexion and extension can be produced in the joint, but the patella is very slightly movable; the head of the tibia is directed somewhat outwards, and the internal condyle of the femur projects too much inwards. All the sinuses about the hip have healed many months since, and his general health is thoroughly established. I have taken the following measurements, which will give you a tolerable idea of the present dwindled condition of the limb.

The distance from the anterior superior spinous process of the ilium to the patella, is two inches less than on the sound limb; the circumference of the middle of the thigh is four inches less, and the calf of the leg three inches less than the same parts of the sound limb.

I am, &c.

HENRY EWEN.

Long Sutton, New Wisbeach.

The appearance of this child's limb, when he was brought to me, is represented in Figure 75. I have only to add to the history with which Mr. E. furnished me, that the patella was very small, and the ankle-joint very weak.

Master C. was submitted to my professional management, and for this purpose was placed in one of my Private Orthopedic Establishments.

I applied my Patent contrivance for the removal of stiffness of the knee-joint, and contractions of the muscles, and daily regulated its action as the parts were able to bear it. The adhesions, which were very strong and firm, gradually gave way under the operation of this apparatus, so that the limb was brought straight. When the apparatus was removed the limb became slightly bent from the elasticity of the

parts and the weakness of the limbs. Measures were also resorted to for the recovery of motion at the hip, and to overcome the contraction of the psoas and iliacus muscles, by which the limb was bent upon the body. I moved the parts daily; and when he was able to bear it, I directed him to go through courses of exercises, for the purpose of bringing the muscles into action and recovering their tone and power; friction and shampooing were also had recourse to. The adhesions and contractions yielded to these means, and as soon as the parts were sufficiently recovered I ordered him one of my Leg Supports, and in a short time after sent him to his father, with the ability to walk with the aid of the Leg Support and a stick. I directed him to continue the use of the knee and leg apparatus, and to exercise the limb freely in the manner I described, and requested his father to send him to me at the end of six months.

At the expiration of this period he returned to town, and upon examining the limb, I found it had increased considerably in size, in firmness, and strength. I kept him in town on this occasion about a month: during this time he was subjected to my usual mode of management. His appearance before he left, as he stood in his Leg Support, is represented in Figure 75, A. He could now stand erect, and walk with considerable firmness and straightness, with the aid of his Leg crutch and a stick, several miles without fatigue.

CASE 58.

PLATE XXXV. Figures 78, and 79. *Show the deformed state of this Boy when I first saw him.*

„ 80. *The Improvement produced by Treatment in Ten Months.*

Edmund Harvey, æt. seventeen, was brought to me from Devonport by the recommendation of Colonel Dixon. This lad's constitu-

SECTION II.

tion is delicate and scrofulous. Until he was about six years old his health continued good. About this time he became restless at night, but did not complain of pain, nor did his health appear disordered. Soon after this he began to limp, favouring the *right leg*, upon which he could not bear his weight without pain. The limb was somewhat bent, so that in walking he bore upon the front of the sole of the foot, and not upon the heel. He was seen by Dr. Donnal, who prescribed for him such means as he thought advisable, but the child continued to get worse. His health began to give way, and his limb became more and more bent. When he was about seven years old an abscess formed in the right hip-joint which was opened. The discharge of pus from the abscess at this time was about two-thirds of a pint. The abscess continued to discharge very freely for three or four months after it was opened, by which he was greatly reduced, so that he was not expected to live; and it did not cease to discharge in a slighter degree until he was about thirteen years old.

When he was about seven years old, the left hip-joint became affected. The limb was gradually bent upon the body, and became fixed in that position. Issues were had recourse to for the purpose of arresting the diseased action in the left hip-joint, which, however, did not cease until he was about eleven years old.

In the progress of the disease the limbs crossed each other, and became fixed in the position seen in Figures 78 and 79. The left knee also was confined in the bent position. He had a fall when he was about eight years old, and at that time hurt his left wrist, in which disease was afterwards set up, leaving a sore which has never since healed. This arm is now much weaker, and shorter, and smaller than the other.

After some years the child gained sufficient strength to move himself upon a small stool, which he did by seating himself on it, and pushing himself forward with his right hand. In a short time he

discontinued the use of the stool and contrived to get forward on his right hand and on his feet. In these movements he placed his left arm across the knee, and the right hand on the ground, and in this manner threw himself forward principally by the force of the right arm. After a time he was able to place his right hand upon his right hip, as in Figures 78 and 79, and walked, placing one foot before the other, with the limbs crossed and the body bent in the position seen in the figures; but without any power of extending the thighs or of separating them from each other, or of producing any movement in the limbs above the knees.

After a considerable time he attempted to swing himself forward upon crutches, which he succeeded in accomplishing, so that he was ultimately able to get forward in this manner with tolerable facility.

When he came to me he could support himself upon the lower limbs in the manner represented in the Figures 78 and 79, and was at that time more erect than at any period after the diseased action subsided in the joints.

This was one of the most frightful cases of the kind that had ever been brought under my observation. There was incurvation of the spine from contraction of the muscles; the head and neck of the thigh bone on both sides were destroyed by the previous disease; the thighs were bent upon the body, and crossed, and were firmly fixed in these positions by the strong adhesions which had formed, and the contractions of the muscles; the left knee was contracted, the left foot had lost its arched form, the left wrist was diseased, and the arm was stunted and weak, but his health was good and his mind determined to follow whatever I should prescribe for his relief.

At my first interview the case seemed to present to me insurmountable difficulties: I determined, however, to cast myself upon the mercy of God, and seek to loose him from his unsightly and apparently hopeless condition. As I contemplated the various bearings of the case, I

SECTION II.

was enabled to see more and more clearly the course of treatment which it would be proper to pursue. It was needful to act upon the body and the limbs in various directions, and I was not acquainted with any means by which I could answer all the indications which presented themselves to my mind. I was enabled, however, to contrive a couch for him which gave me many facilities in the management of his case. By means of this couch I could gradually move the limbs or the body in any direction that tended most to loosen the ligamentous adhesions and overcome the contractions of the muscles; and I was able to alter my bearings, from time to time, as the altering condition of the parts required. In the course of four months the limbs were straightened and separated. At the end of that time he left his bed, and supported himself with the assistance of my Leg Supports and crutches in a position nearly as erect as in Figure 80; but he had very little strength in the limbs, the muscles being dwindled and weak for want of use. The right limb appeared to be the shortest, but upon carefully measuring both limbs it was found that the difference was produced by a tilt of the pelvis, and that the right limb, which appeared to be the shortest, was in fact about half an inch longer than the left.

The adhesions at this time were not sufficiently overcome to allow him to place the toe of one foot more than three or four inches before the toe of the other. After I had exercised him about three weeks to see how far the parts would give way under the efforts of the muscles, I found that he had gained but little in the extent of motion backward and forward; I therefore placed him upon his mechanical bed again, and directed the action of the bed upon the limbs and pelvis in such a manner as tended to overcome the adhesions and contractions by which the limbs were prevented moving, one before the other, in the act of progression. He remained upon his mechanical bed on this occasion two months, during which a considerable extent of motion of the limbs backward and forward was obtained.

He was now directed to leave his bed and use his Leg Supports and crutches as before, which he has been doing about three months. He has been gradually gaining strength, and at this time he can stand without assistance, as represented in Figure 80. He can, with a little assistance, place the heel of one foot, *fourteen inches* before the toe of the other; as he stands he is able to separate the ankles laterally ten inches and a quarter without help. At present his step in walking leaves a space measuring from seven to eight inches between the heel of one foot and the toe of the other: he can walk in this way with the assistance of his crutches, about two miles an hour without fatigue.

Remarks.

The muscles of the limbs continue to gain strength, and it is probable that this boy will ultimately be able to walk tolerably well without the aid of crutch or stick, or any other adventitious support.

Of Stiffness and Contractions of the Knee-joint.

Very common in the knees.

Stiffness and contractions occur, perhaps more frequently in the knee than in any other joint of the body. The stiffness and contractions usually take place during the continuance of active disease in the joint, but contractions, by which the extension of the limb is hindered, are sometimes entirely muscular.

Bony Anchylosis.

Sometimes the diseased action goes on to such an extent, as to destroy the cartilages; and ends in bony union of the opposing surfaces of the tibia and femur, by which these bones are prevented moving upon each other. This state of the parts is wholly irremediable without operation.

Anchylosis of the patella.

In some cases the patella is fixed by bone to the femur; when this happens the free movement of the joint cannot be restored. The limb, however, might be straightened, as in Plate XXXIV., Figures 76 and 77, and the person enabled to walk with the limb in the straight

SECTION II.

position, but nothing further can be accomplished without operation, which in these cases is rarely advisable.

Some of the ligaments injured or destroyed.

The internal ligaments of the joints are sometimes partially destroyed and the thigh-bone is consequently allowed to move out of its proper bearing upon the large bone of the leg. These are severe cases, but the adhesions may be elongated or removed, and the muscles restored to their natural functions by the means which I employ.

Fixed contraction.

In all these cases the flexor muscles of the leg acquire a fixed contraction; the tendons behind the knee feel like extended cords when any attempt is made to straighten the limb; and if the diseased action has existed long in the joint, the contraction of the muscles cannot be overcome without artificial means.

Union of the bones by adhesions.

When the knee is bent, in consequence of disease in the joint, strong ligamentous adhesions are formed, by which the opposing surfaces of the bones which enter into the composition of the joint become bound more or less together. Sometimes these adhesions are so numerous and strong that it is difficult to produce any perceptible motion of one bone upon the other, and consequently a very careful examination is sometimes necessary, in order to enable the surgeon to determine whether the bones of the joints be united together by adhesions, or by the interposition of osseous matter. It is, however, important to make up our minds upon this point, as restoration cannot be effected where there is bony anchylosis; but where stiffness arises from the deposition of adhesive matter it might commonly be removed.

Important to discover whether the union be by bony or soft material.

Stiffness from confinement.

In some cases the functions of the knee-joint are lost from long confinement, and several weeks, in severe cases, may elapse before the free motion of the limb is restored after the contractions of the muscles have yielded.

Treatment.

Bony anchylosis not curable by apparatus.

Nothing can be done for the restoration of the parts when the leg and thigh bones are united by osseous matter. The limb remains permanently fixed in the position in which it is held by the bony deposit.

When the patella only is united by bone, the soft adhesions, within the joint, should be carefully elongated or removed by gradual extension, which at the same time removes the contraction of the muscles. This process should be carried on gradually as the parts are able to bear it, and should not be proceeded with as long as there is any tenderness in the joint. Should any tenderness arise from the treatment, the extension should be suspended for a day or two until it is subdued. Great care is necessary in many of these cases, in order to conduct them to a favourable termination. When the limb is fully extended the patient should be furnished with a Leg Support, by which he will be enabled to walk without difficulty with the limb in the straight position.

When the patella is united by bone.

Treatment when the limb is extended.

CASE 59.

The knee-joint of a young woman, aged twenty-five, became stiff, in consequence of inflammation of the synovial membrane, which commenced about three years and a half before I saw her. The inflammation had been several times subdued, but had been as frequently reproduced by the attempts which were made to restore the motions of the joints*. The limb was fixed by the adhesions and contractions, in such a manner that she could only bring her toe to the ground in the act of walking. I applied my apparatus as for a stiff knee-joint: the motions of the joint were re-established, and the apparatus was removed at the expiration of five weeks from the time it was first applied. The functions of the muscles were restored in a short time, and she was able to walk in a natural manner without difficulty.

* This is a very frequent result of the Treatment usually adopted.—AUTHOR.

CASE 60.

Plate XXXIV., Figures 76 and 77. Improved state.

Master B——— was sent to me by Mr. Sleight, a respectable surgeon in Hull, with the leg bent upon the thigh, and very strongly fixed in that position by ligamentous adhesions in the joints, and contractions of the flexor muscles of the leg.

Master B. suffered severely from the measles by which he was much reduced in strength. After this the knee became affected in such a manner that he always favoured it in walking by inclining to the affected side. At this time in crossing the Humber, he had to pass in an open boat to a packet-boat, and on this occasion had his knee severely pressed between the open boat and the packet. Sometime after this he injured it again with a garden roller. The inflammation gradually increased, and appeared to baffle the skill of the family surgeon.

Mr. Sleight was then requested to see the child; and he has kindly furnished me with the following remarks respecting this case:—"At the time my attendance on Master B. commenced, he was suffering from long continued chronic inflammation in the knee-joint, which was very much enlarged, and in two or three places, on the outer side of the knee, there was an elastic feeling conveyed to the touch, as if suppuration was taking place. The leg was very much bent, and appeared to be quite immovable.

"The treatment employed consisted in the repeated application of leeches, and blisters, and issues, and afterwards, as soon as the condition of the parts would allow, frictions with iodine and hydriodate of potass united were had recourse to, and continued at regular periods, until the disease in the joints was subdued. The leg remained bent upon the thigh, and there was great reason to fear that the deformity and contraction would be permanent." When this young gen-

tleman was brought to me, I found that the patella was united to the femur by bone, and that perfect restoration could not therefore be expected. The internal ligaments had been partly destroyed by the disease, and the tibia was partly dislocated backward, which is shown in Figure 76, by the deep shading under the knee.

I employed my invention for the removal of contractions of the knee-joint, and proceeded very cautiously in my management. When there was any tenderness produced in the joint, I had recourse to spirit lotion for a day or two, and then continued my plan as before, until I succeeded in bringing the limb to the degree of straightness represented in the Figures; after this I raised the boot on the affected side three-quarters of an inch, and furnished him with one of my Leg Supports, with which he is now able to walk, with very little apparent lameness. He has some motion in the joint, but this is of no use to him, as the knee-cap continues fixed by the interposition of bone.

Motion restored after destruction of ligament and partial displacement of the bones.

When the internal ligaments have been so far destroyed as to allow the tibia to be partially dislocated backward, but without bony union of the patella, the movements of the joints may be restored, and the patient ultimately enabled to walk without artificial support, as in the following case.

CASE 61.

Miss ———, the daughter of a respectable tradesman, was placed under my care by the recommendation of Dr. Williams. This child was labouring under stiff knee-joint, arising from disease. The disease of the joint had been very severe. The internal ligaments were partially destroyed, and the tibia was partly dislocated backward, as in Case 60.

I applied my apparatus for stiff knee-joint, and carefully regulated its operation, in which I was well seconded by her prudent and attentive mother.

SECTION II.

The stiffness gradually gave way to the action of my contrivance, and when the limb was sufficiently straightened, I discontinued the stiff knee-joint apparatus, and applied my Leg Support, by which she was enabled to walk upon the limb. The limb continued very weak for a considerable period, and she did not leave off the Support for about five years. She has now acquired free motion in the joint, and she walks without limping, unassisted by artificial means. The limb is the same length as the other, but in circumference it is not so fully developed.

Division of the tendons not required.

I have never found any necessity for dividing the tendons of the flexor muscles in these cases; neither do I apprehend that the restoration of the movements of the limb would be facilitated by this operation in any considerable degree. According to my experience the fixed contraction of the muscles is easily overcome; and where it is not congenital, and has not been permitted to remain for many years, from early childhood, the division of the flexor tendons ought not to be performed.

CASE 62.

A lady from Berkley, in Sussex, about thirty years of age, was recommended to me by Mr. Iliff, a respectable surgeon at Kennington. She had been unable to stand for five years, in consequence of a fixed contraction of the flexor muscles of the legs, by which the legs were retained, so as to form acute angles with the thighs: during this period the lady was lifted into and out of bed, and was carried from place to place by her attendants, or in her carriage.

She had submitted to various modes of treatment recommended to her by some of the most able surgeons in London, all of which had completely failed.

I applied one of my apparatus for stiff knee-joint to each limb. The limbs were strengthened in a *week*; and she was able to walk across the drawing-room, *without the apparatus*, at the expiration of *twelve*

days from the time they were first applied, steadying herself only by holding a friend's arm. She soon recovered the strength of the muscles and the free movements of the joints: and I found several years afterward that there had been no return of the complaint. SECTION II.

In this case the contraction was unaccompanied with disease in the joint; and it shows how readily such contractions yield to the operation of well adapted and carefully managed apparatus. This takes place not only where the contractions commence after the growth of the body has ceased, but in those which take place during its growth. Remarks.

CASE 63.

Miss ———, æt. fourteen, had inversion of the left knee-joint, which commenced ten years before I saw her; and for the last five years she has also had contraction of the flexor muscles of the limb, which arose from a diminution of power in the extensors. When I applied my apparatus for the removal of the contractions of the knee-joint, the leg was confined by the contracted muscles, so that when it was extended, it formed nearly a right angle with the thigh. In the course of *ten days*, the contraction of the muscles was overcome, and the limb was so far straightened. This lady is now under treatment in one of my Establishments, and is wearing one of my Leg Supports, by which I have been able to remove the inversion of the knee and ankle, and am now taking means for the strengthening of the muscles.

When muscular contractions have existed many years from early childhood, they yield more slowly, but the muscles gradually become elongated by the careful employment of my apparatus. Remark.

Of Stiffness of the Ankle-joint, and Contractions of the Muscles producing Distortions of the Foot.

Stiffness of the ankle-joint, from the effects of disease, is far less common than the same complaint in the knee and elbow-joints. From disease.

SECTION II.

Terminating in bony anchylosis.

In the formation of adhesions. Treatment.

If the diseased action terminates in bony anchylosis, nothing can be done with safety for the restoration of the motions of the joint; but should the stiffness arise from adhesions, resulting from disease or accident, friction and shampooing should be had recourse to; passive motion should also be employed, as far as the parts are capable of bearing it.

When the foot points to the ground.

If the joint be fixed with the toe pointing towards the ground, as in Plate XXXIII., Figure 74, the judicious use of my Patent apparatus for talipes equinus should be used. This contrivance gradually overcomes the contractions of the muscles, and elongates the adhesions of the joint.

These means may be assisted by the use of warm water, and by ointments containing hydriod: potassæ, which may be rubbed upon the parts round the joint, morning and evening as in other cases of a similar nature.

Impeded motion from permanent contraction of muscles.

Sometimes the free movement of the joint is prevented by the permanently contracted and shortened state of the extensor muscles of the foot. This condition of the muscles may be congenital, or it may take place from accidents, by which the extensor muscles themselves may be injured, or from constitutional disturbance, by which the due antagonization of the flexor and extensor muscles may be lost.

CASE 64.

A boy in St. Thomas's Hospital, a patient of Mr. Travers's, had a deep laceration of the muscles of the calf of the leg, part of which was torn away. After the accident, the muscles situated on the back of the leg acted spasmodically, and the front of the foot was carried back, so as to form nearly a straight line with the front of the leg. The usual means were resorted to, in order to elevate the foot, and to bring about free motion in the joint; but without success.

The wound at the back of the leg was nearly healed when I first saw the patient, in company with Mr. Travers; and on my stating to

Mr. T. that I had derived great benefit from the use of the apparatus which I employed in cases of *pes equinus*, he expressed his desire that it should be tried in this case. The apparatus was applied and used according to my direction, and we had the satisfaction to find that it soon removed the deformity, so that the boy left the Hospital with his limb as useful as before the accident occurred.

CASE 65.

A lady was recommended to my care by Sir Charles Scudamore, in consequence of a contraction of the muscles at the back of the legs, producing extension of the feet to so great a degree, that the front parts of the feet formed with the legs a curved line, with the centre of the curves projecting forward. This condition of the feet was produced by constitutional disturbance.

This lady was exceedingly sensitive in mind and body, and the state of her feet distressed her very much. I applied my apparatus, for *pes equinus*, and in the course of a few months the contractions were entirely removed, and the feet restored to their proper position. I have since seen this lady repeatedly, and she is now able to walk with facility and ease.

When the limb of the affected side is shortened, so that the extension of the foot only makes up the difference in the length of the lower limbs in the act of standing, it is not proper to attempt to remove the contraction. The treatment, is these cases, is to support the limb effectually, with the foot in the extended position.

When the foot points to the ground, and the limb is shortened.

CASE 66.

PLATE XXXIII., Figure 74 *Shows the Deformed State.*

Master Staples, æt. eighteen, has his left lower extremity in a stunted condition. The tibia, on the lame side, is one inch and a half

SECTION II.

shorter than the other. The foot points to the ground, and is fixed in the extended position firmly by the permanent contraction of the extensor muscles, the toes turned slightly inwards, and the ankle outwards. The power of the peronei and flexor muscles is nearly gone. This affection of the limb commenced when he was about three years of age; the cause was not evident.

He had worn irons, recommended by Sir Astley Cooper, for five years, by which he was somewhat benefited; when he came to me, however, he could not walk without much distress and lameness, even across the room. I applied one of my Ankle-Supports for his relief, and at the end of three weeks after the application of my Support, he had gained the power of walking as much as ten miles a-day, without distress and with little claudication.

Of Stiffness of the Shoulder-joint.

Rarely met with.

This is a complaint of comparatively rare occurence, except in connexion with diseased action in the joint.

Treatment.

When the diseased action has been subdued, friction, shampooing, and passive exercise, with appropriate embrocations, remove the stiffness in the course of a short time. The patient should be directed to use the arm freely, so as to bring the muscles into action, for the purpose of recovering their tone and freedom of movement.

Of Stiffness of the Elbow-joint, accompanied with Muscular Contractions.

Common from disease and accident.

Stiffness in the elbow-joint, arising from disease and accident, is not uncommon. Sometimes the disease ends in bony anchylosis, which cannot be removed with safety. Frequently the adhesions which form in the joint are so strong that little movement can be discovered.

Movement interrupted also by muscular contraction.

A shortened and contracted state of the flexor muscles is observed, and the arm is bent at the elbow in different degrees in different

cases; sometimes the biceps is found permanently contracted, without being preceded by or accompanied with disease in the elbow-joint.

Treatment; with the author's contrivance.

The adhesions and muscular contractions, which prevent the natural movements of the parts, readily yield to the operation of my Patent apparatus for the removal of these affections as they occur in the elbow joint.

Advantage of this apparatus.

The great advantage of this contrivance, and that which I employ in similar affections occurring in the knee-joint, consists in its enabling the competent, judicious, and careful surgeon to conduct these cases to favourable terminations, with little inconvenience to the patient, and without any danger of reproducing disease.

CASE 67.

A supervisor of the excise applied to me to restore the motion of his elbow joint, which had become fixed at an angle of about twenty-five degrees, in consequence of a compound fracture of the inner condyle of the humerus, which happened about four months previous to my seeing him, and had united with the inner condyle in an unnatural position.

I was apprehensive that the position of the inner condyle of the humerus would impede my efforts to restore the motions of the joint; but at the same time I was of opinion that the functions of the joint might be brought about, at least so far as to enable him to follow his usual avocation, which he was now prevented from doing, in consequence of the stiffness of his elbow.

I applied one of my inventions which moved by gentle degrees under the action of a screw, and moved the lower arm upon the upper in opposite directions; first, so as to bend the arm, and then so as to straighten it. In three weeks I succeeded in straightening the limb, and in bending it, so that he could touch the chin with the wrist. The

SECTION II.

apparatus was then removed in order to restore the muscles to their natural activity and power.

Remark. The apparatus used in this case operates upon the same principle as that which I employ in cases of stiff knee-joint, and is equally efficient in all cases of contractions of the muscles, which affect the movement of the elbow-joint.

TALIPES.

This would be the proper place to speak of Talipes: the observations, however, contained in Dr. Little's excellent work, respecting club-foot and club-hand, have, in some respects, extended my views in reference to cases of talipes; I shall not, therefore, at present enter upon the consideration of this important subject. This class of distortions is now being duly considered by medical men, and we might expect that the treatment in all its bearings will ere long be established upon sound surgical and mechanical principles.

Of Deformities of the Toes, and of Corns and Bunyons.

Deformities of the toes are commonly occasioned by badly constructed shoes. The characteristics of corns are too well known to need particular description. They arise from slight inflammatory action produced by friction and pressure. Bunyons are often attended with inflammation of the bursa of the affected joint, and generally with more or less displacement of the bones of the great, and sometimes also of the little toe. Corns and bunyons are known by the experience of most persons to be very troublesome and often very painful affections.

Causes. The causes of these complaints is to be attributed to the want of soundness in the principles upon which shoes and boots are commonly made. These needful articles are often too short for the feet, and too narrow across the toes, and the feet are not properly supported by them. The toes are pressed together, deformed, and often made to cross each other, partly for want of room in the length and breadth of the shoes,

and partly from want of adequate support round the metatarsal bones. In order to make this matter more evident I will give a general description of the anatomy of the foot, so far as may tend to illustrate this subject.

Sketch of the anatomy of the foot.

The foot is composed of seven bones, called tarsal bones, which are situated at the back part of the foot, five long bones called metatarsal bones, which are in the front of the foot, and to which the bones of the toes are joined. The tarsal and metatarsal bones form the solid parts of the arch of the foot. These bones are joined together by ligaments, and sustain the weight of the body in standing and walking.

Effect of the weight of the body upon the foot.

The ligaments allow the bones a very limited motion upon each other; this is sufficient to permit a slight yielding of the arch of the foot when the weight of the body is thrown upon it. The metatarsal bones spread out laterally under the influence of the weight, especially just above the toes; and when they are bearing their share of it, the toes spread, not directly through the influence of the weight, but indirectly and passively from the lateral or spreading movement of the metatarsal bones. These movements are in some degree controlled, and restrained within certain limits by the muscles and ligaments of the feet.

From what I have said respecting the anatomy of the foot, it will be seen that if there be not room left in the shoe for the toes to spread laterally, in a corresponding degree with the metatarsal bones, they must be compressed; and if the foot be not effectually supported immediately above the toes it will spread at that part so as to require the shoe to be made very wide across the toes, in order to prevent them from being pressed upon injuriously.

Feet yield to the weight.

The weight is naturally sustained by the tarsal and metatarsal bones, and not by the toes. The arches of the feet yield, and the metatarsal bones spread at their lower ends, in different degrees in different persons.

SECTION II.

Hence it happens that the feet are longer and wider when bearing the weight of the body than they are when lifted from the ground. In some persons the yielding is slight, and in some considerable. In these alterations in the length and width of the feet, the toes are not directly influenced by the weight, but indirectly and passively, as I have said, through the metatarsal bones; as the arches of the feet yield, the toes are thrust forward by these bones, and as these bones spread laterally, the toes spread laterally with them. These passive movements of the toes are more or less extensive according to the degree in which the arches of the feet yield, and the metatarsal bones spread under the superincumbent weight of the body, and consequently the toes, being the weaker parts, must suffer if they have not sufficient room for these passive movements to take place in the shoe.

Not understood by shoemakers.

These alterations in the condition of the feet, when sustaining the weight, and when the weight is removed, has not been sufficiently described, and is not properly understood by shoemakers, and consequently no effectual provision is made for it in the construction of shoes and boots. They are accustomed to allow a little room for the elongation of the foot when the weight is upon it; but this very frequently is not sufficient. Their rules for measuring are not based upon anatomical principles, and therefore are not to be depended upon.

Their rules for measurement not based upon anatomical principles.

From this cause arises, it may be said, nine hundred and ninety-nine cases of deformities of the toes, and of corns and bunyons, out of every thousand.

How to preserve the feet from these evils.

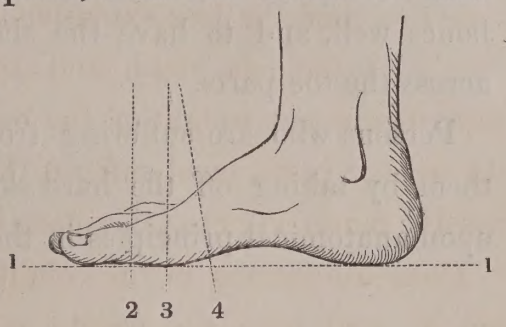
In order to avoid these evils the shoes must be made sufficiently long to prevent the extremity of the great toes being pressed upon when the person is in the erect position; they must be made sufficiently wide across the toes to prevent lateral pressure upon them when the weight of the body is upon the feet, and they must be made sufficiently close round the lower parts of the metatarsal bones to sustain these

bones and prevent them from spreading under the influence of the weight in standing and walking.

Mode of measuring the feet upon anatomical principles.

It appears to me that I cannot do better, for the prevention and cure of these complaints, than by giving some rules for measuring the feet upon anatomical principles. By following these rules much suffering will be prevented, and at the same time the needful support will be obtained.

In order to accomplish these purposes, both feet should be measured, partly in the erect, and partly in the sitting posture, at the parts shown by the dotted lines in the Figure. The first measure, 1, should be taken with the person standing upon the measure. The measure round the toes, 2, should be taken in the standing posture, with the foot bearing upon the ground, as in the diagram. The first gives the extreme length of the foot when the arch has yielded under the influence of the weight; the second gives the spreading of the toes. The third and fourth (3, 4) measures, round the foot, should be taken when the foot is lifted from the ground: all the other measures to be made according to the usual rules which shoemakers are accustomed to follow. The object of this mode of measuring is to cause the shoe to support the metatarsal bones, and to insure sufficient room for the toes. The support of the shoe should be felt, by the wearer, *above the toes, and not upon them. The toes should have room to move freely, and not be pressed upon by the shoe at any part.*



The advantage of following these rules.

When these rules are duly acted upon, by observant persons who have acquired experience in this mode of measuring, the shoe gives no more inconvenience to the wearer than a glove, and at the same time gives comfortable support to the foot, which is preserved in its natural symmetry and beauty, free from corns and bunyons.

SECTION II.

Means for relief.

Those whose toes have become deformed from the causes I have mentioned, and who are suffering from bunyons, should have their shoes made upon the principles I have pointed out. If the bunyons spread much, as in Fig. 70, Plate XXXII., the foot should be supported above the toes by a common bandage. Sometimes a little wadding or other soft material should be placed in the hollow formed on the inner edge of the foot above the ball of the great toe, in order to fill it up. Great care should be taken in these cases to support the metatarsal bones well, and to have the shoes sufficiently long, and also roomy across the toe parts.

Of corns upon the toes.

Persons who are suffering from corns upon the toes may get rid of them by taking off the hard skin, and wearing shoes or boots made upon anatomical principles in the manner I have mentioned.

THE END OF VOLUME ONE.

LONDON: Printed by WILLIAM CLOWES and SONS, Stamford Street.

PLATE I.

Fig: 1.

Fig: 2.

F. Tallham del. et lith.

PLATE II.

Fig: 3.

Fig: 4.

Col. 58.

F. Tatham del et lithog.

PLATE III.

Col. 43.

Fig. 5.

Fig. 6.

PLATE IV.

Fig 7

Fig 8

Col 49.

P. Dickson del et lithog.

PLATE V.

Fig 9.

Fig 10.

Col. 18

F. Tatham del et lithog

PL. VII. VI.

Fig. II.

Fig. 12.

Col. 41.

F. Tatham. del. et lithog.

PLATE VII.

Fig. 13.

Fig. 14.

Col 47.

F. Tatham del et lithog.

PLATE VIII.

Fig. 15.

Fig. 16.

Col. 14.

F. Tatham del et lithog.

Fig 18

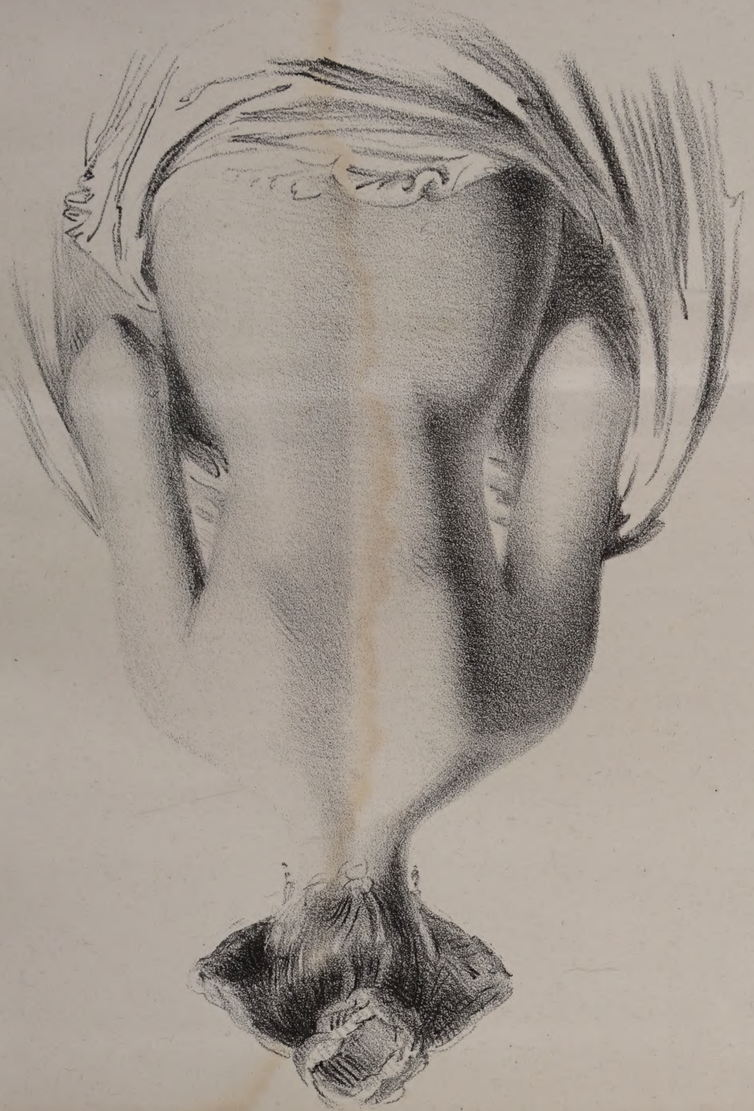


Fig 17

Fig 20

Fig 19

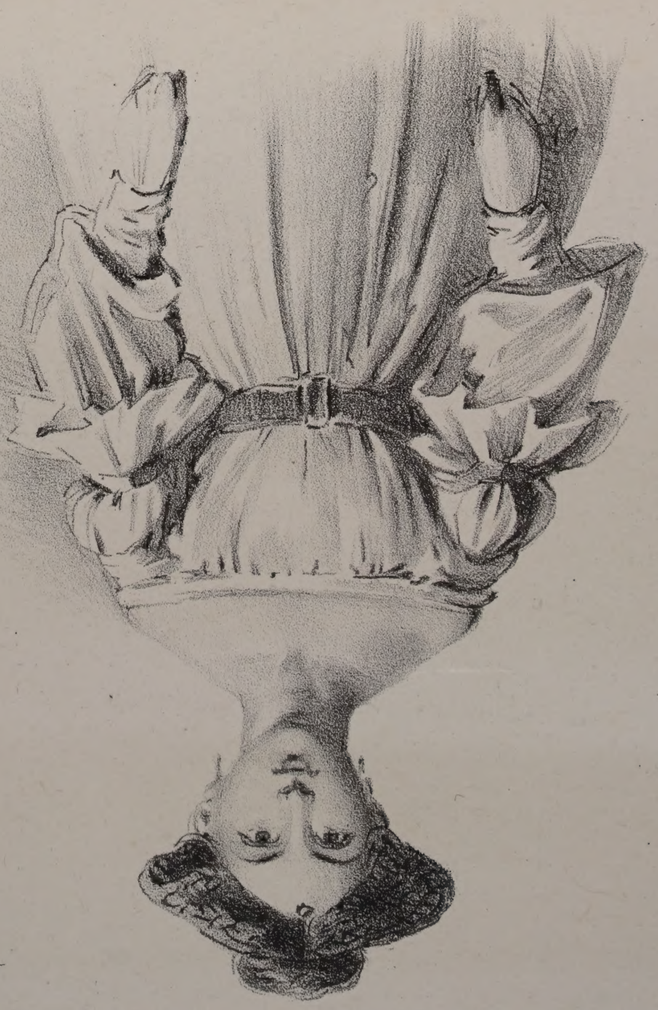


PLATE IX

F. Tahsam del et lithog

Fig. 21

Fig. 23

Fig. 22

Fig. 24

PLATE X

PLATE XI.

Fig. 25.

Fig. 26.

PLATE XII.

Fig 27.

Fig 28.

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F. Tatham del et lithog.

PLATE XIII.

Fig. 29.

Fig. 30.

PLATE XIV.

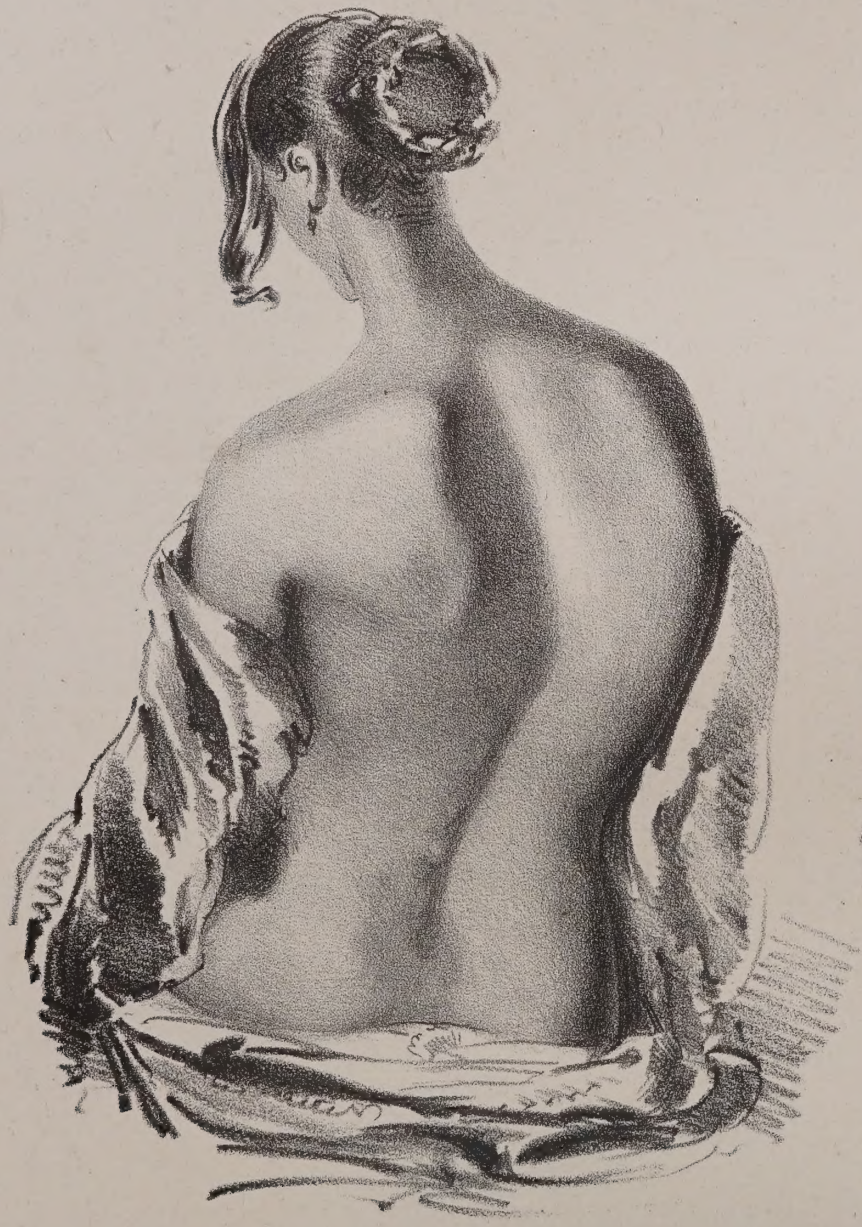


Fig. 31.

Fig. 32.

Col. 13.

F. Tatham. del. et lithog.

PLATE XV.

Fig: 33.

Fig: 34.

Col. 1

F. Latham del et lithog

PLATE XVI.

Fig. 35.

Fig. 36.

PLATE XVII

Col. 53.

Fig. 37

F. Tatham del. et lithog.

Fig. 38

Col. 50

PLATE XVIII.

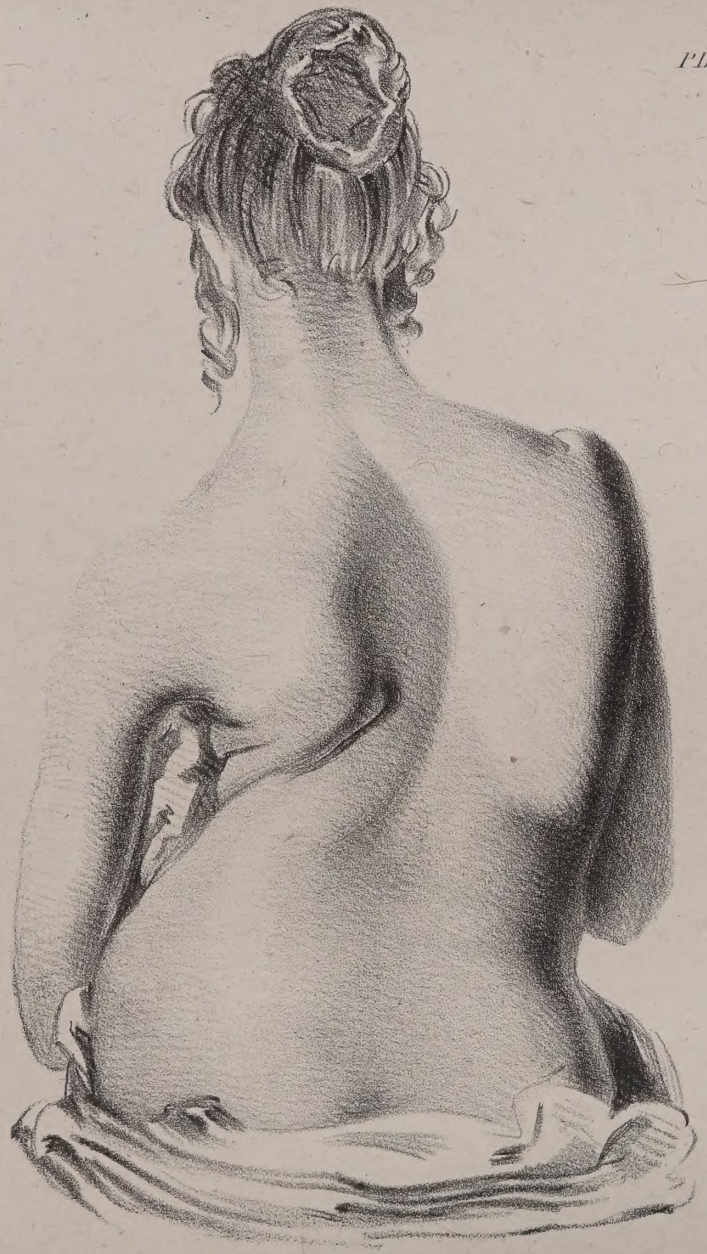


Fig 39.

Fig 40.

PLATE XX.

Fig. 41.

Fig. 42.

Col: 54

F. Tatham. del. et lithog

Col. 67.

PLATE XX.

Fig. 44.

Fig. 43.

PLATE XVI

Fig. 45.

Fig. 46.

PLATE XXII.

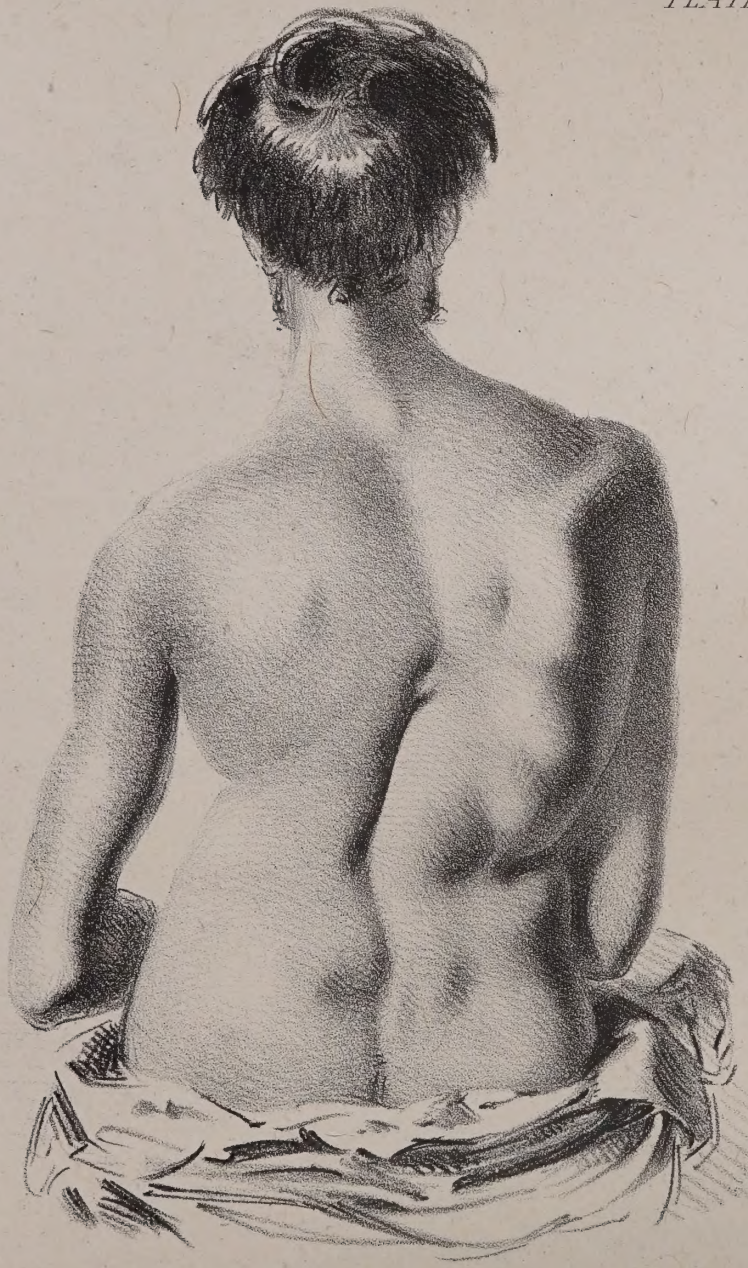


Fig. 47.

Fig. 48.

Col. 34.

F. Ixtham del et lithog.

PLATE XXIII

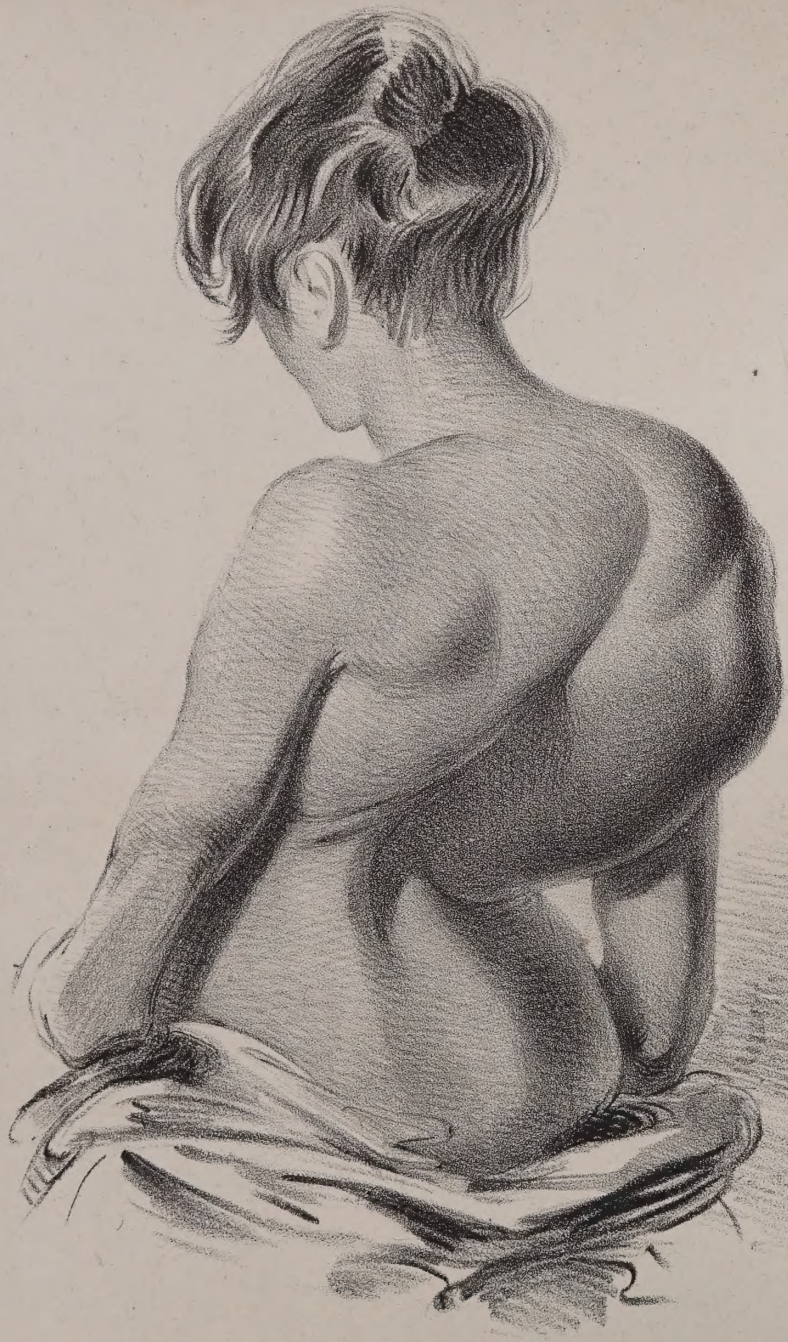


Fig 49

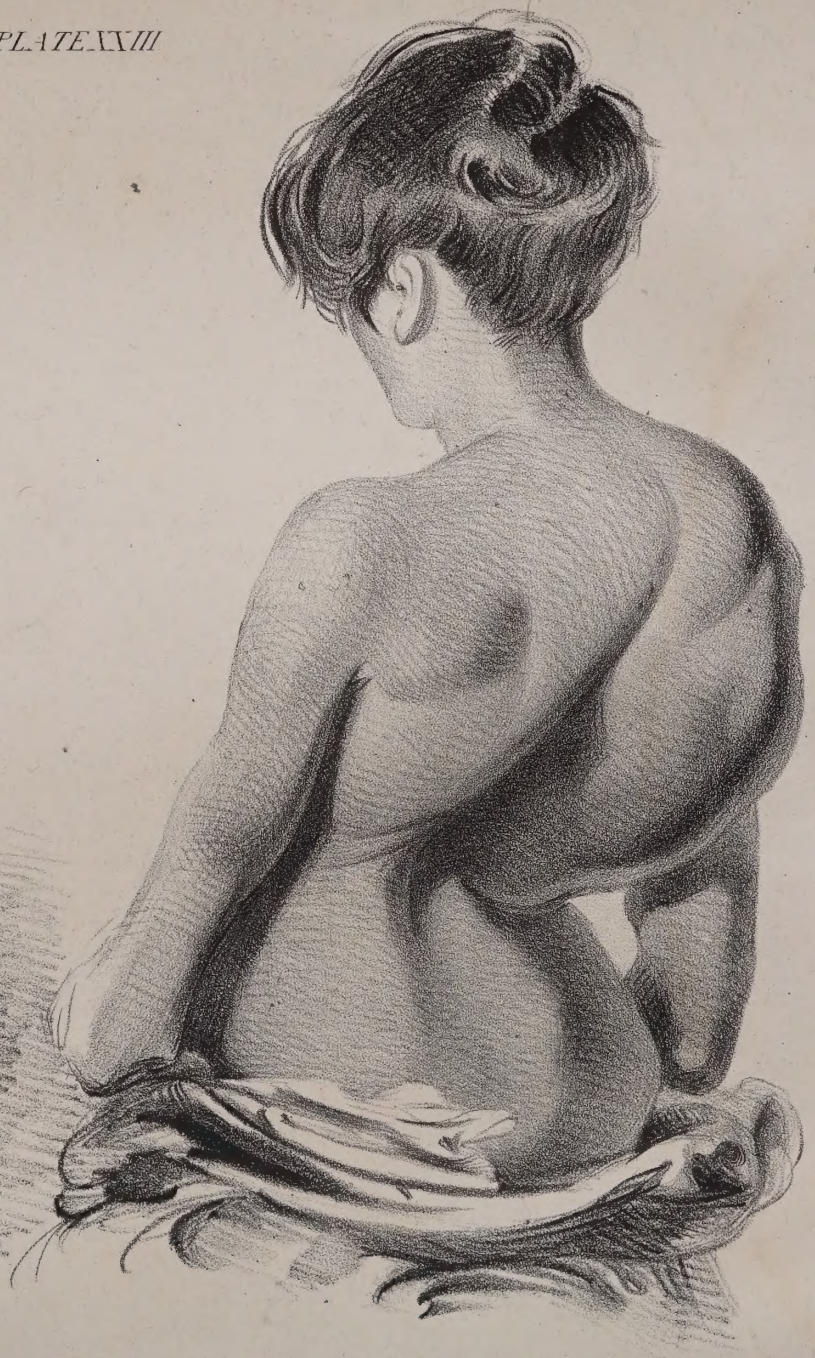


Fig 50

PLATE XXIV.

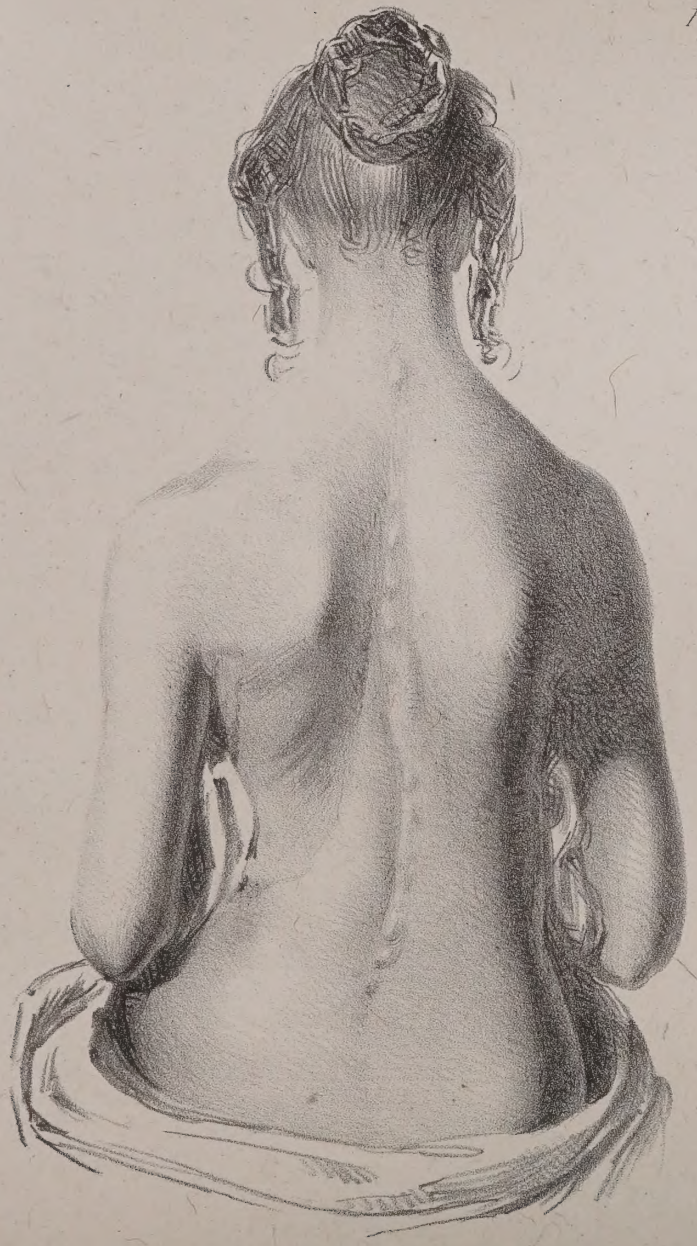


Fig. 51

Fig. 52

PLATE XXV.

Fig. 53.

Fig. 54.

Col. 8. F. Tatham del. et lith. og. Col. 26.

PLATE XXV A.

Fig. 54 C.

Fig. 54 B.

Col. 131.

Col. 132.

F. Tatham del et lithog.

PLATE XXVI.

Fig. 55.

Fig. 56.

Col. 39.

F. Iveham del et lithog.

Col. 52.

PLATE XXVII.

Fig. 57.

Fig. 58.

Col. 23.

F. Tatham del et lithog.

PLATE XXVIII.

Fig. 59.

Fig. 60.

F. Tatham del et lithog.

PLATE XXIX.

Fig. 61.

Fig. 62.

F. Tatham del et lithog

PLATE XXX.

Fig. 63.

Fig 64

Col. 78.

F. Tatham del. et lithog.

Fig. 66.

Fig. 67

Fig. 65

PLATE XXXI

Col. 80.

F. Fairholt del et lithog.

Col 79

PLATE XXXII.

Fig. 71.

Fig. 72.

Fig. 73.

Fig. 68.

Fig. 69.

Fig. 70.

F. Tatham del. et lithog.

Fig. 74.

Fig. 75.

Fig. 75 A.

PLATE XXXIV.

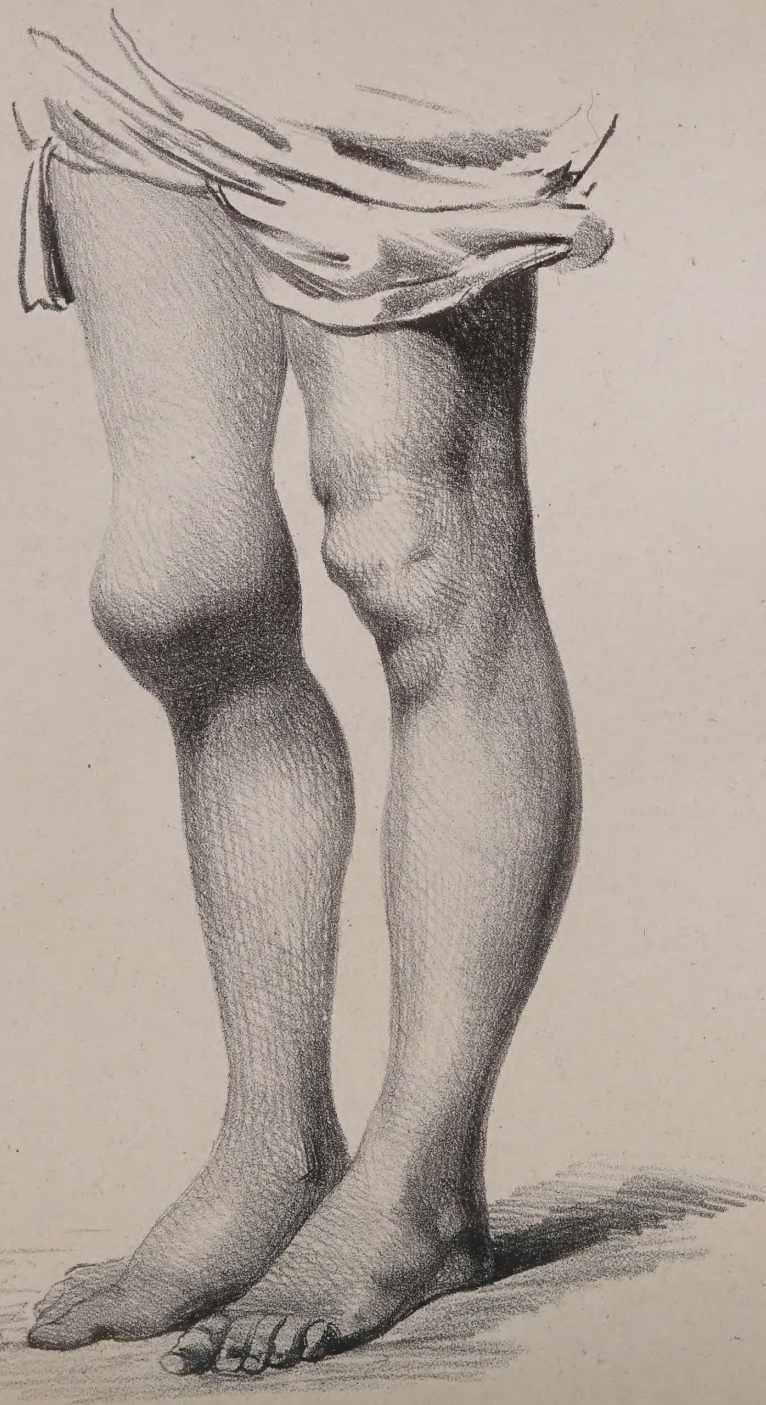
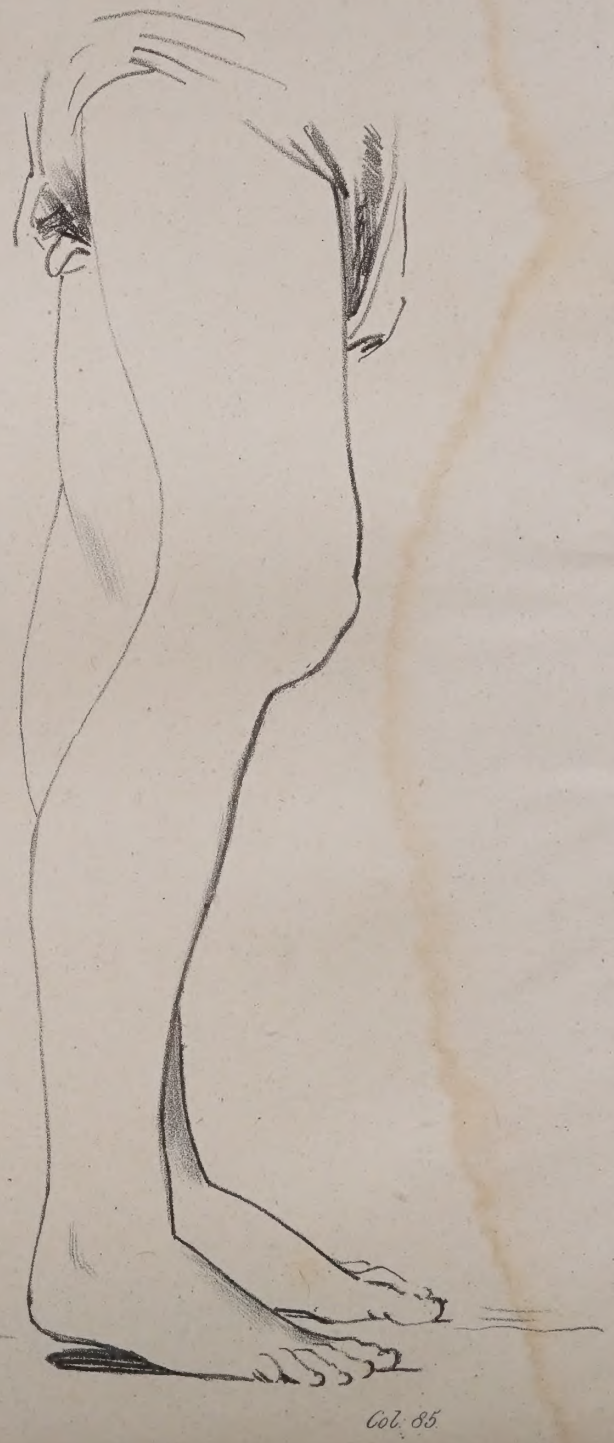


Fig. 76.



Col. 85.

Fig. 77.

Fig. 69

Fig. 68

Fig. 70